JUN 8 1921 Medical Lib.

Vol. XI TORONTO, JUNE, 1921 No. 6

The Canadian Medical Association Journal

THE OFFICIAL ORGAN OF

THE CANADIAN MEDICAL ASSOCIATION

AND ITS AFFILIATED PROVINCIAL MEDICAL ASSOCIATIONS

PUBLISHED MONTHLY BY

THE CANADIAN MEDICAL ASSOCIATION, 836 UNIVERSITY STREET, MONTREAL

Lederle BIOLOGICAL PRODUCTS

ARE INDISPENSABLE IN THE DIAGNOSIS PREVENTION AND TREATMENT OF DISEASE

Descriptive Price List on application to our nearest office

HAY FEVER Can Be Prevented With Pollen Antigen Lédérlé

Clinical results, covering more than 18,000 cases, show that Pollen Antigen has afforded relief from hay fever in 82% of the cases.

Prophylactic treatment should commence six weeks before the usual onset of attack.

LEDERLE ANTITOXIN LABORATORIES

464 St. Catherine St. West MONTREAL

511 Fifth Avenue NEW YORK

265 Portage Avenue WINNIPEG

SEVENTY-FIVE CENTS THE COPY FIVE DOLLARS THE YEAR

Announcing still another variety of Arsenical

NOVARSAN

Especially adapted to administration in concentrated solution.

Easily tolerated.

Simple to prepare for injection.

MERCURY SALICYLATE

This valuable adjunct in the treatment of Syphilis is now prepared by us and is ready for distribution.

1. **Contained in *compressible capsules.***
2. **A suspension in a *fatty cream.***
3. **Simplifies intramuscular injections.**
4. **Readily absorbed.**
5. **Minimum of discomfort.**

Literature on both these new preparations gladly sent

SYNTHETIC DRUG CO. LIMITED

TORONTO — **Canada**

The Canadian
Medical Association Journal

VOL. XI. TORONTO, JUNE, 1921 No. 6

THE IMPORTANCE OF PRECISE ANATOMICAL KNOWLEDGE IN THE SURGERY OF THE PERIPHERAL NERVES

ALEXANDER GIBSON, M.A., M.B., CH.B., F.R.C.S., F.R.S.E.

THE military activity of the years 1914–1918 forced upon the attention of the surg cal members of our profession a number of problems different from those of peace time. Perhaps it is more exact to say that there were few problems of a different character, but there were provided in wholesale measure examples which civil life furnished with a sparing hand. Such problems were those of the treatment of compound fracture of the femur; of acutely infected joints; of dealing with large bone cavities; of mal-united or ununited fractures; of loose or flail joints; of injuries to the peripheral nerves. All of these problems have been attacked with resolution and ingenuity. To some of them an appropriate solution has been found in the case of others we are still groping after an answer. The subject with which we wish to deal more directly to-day is that of lesions of the peripheral nerves. In times of peace all of us have sutured the median nerve at the wrist as an incident in patching up an accidental cut. Some of these cases doubtless did very well, while others obtained varying degrees of recovery, or none. Not everyone of us would take his oath that he had not joined the proximal part of the median to one of the flexor tendons. Be that as it may, nerves were not regarded by the surgeon as being of any more importance than blood-vessels. Experience of war surgery has changed all that. When formerly there were scores of cases, to-day these can be reckoned by the thousand, and much of the air of mystery that surrounded peripheral nerve lesions has been dispelled.

Nerve lesions were always, to some extent, a "terra incognita", and not a little of the hesitation we felt in regard to diagnosis and prognosis, was owing to the misleading information scattered through text-books and systems, and sponsored by great authorities. In point of the surgical treatment we were bidden to observe methods of lateral implantation or of nerve grafting, or of turning down flaps to bridge gaps. You inserted a nerve into a slit in a neighbouring nerve. Further along the uninjured nerve (sensory or motor or mixed, mattered not a jot), you inserted the other loose end of the injured nerve, and then by some mysterious chemiotactic or neurotropic influence, some neural alchemy, a glad reunion occurred and all was well. Or, dealing with a nerve as if it were a mere tendon, you carefully turned down a flap to bridge a gap. Any feat of ingenuity which would accomplish physical or chemiotactic continuity would solve the conundrum. All that is changed and in speaking of nerve surgery one sometimes wonders what there is in the subject to occupy more than five or ten minutes of time. The whole matter can be put in a single sentence. If one can obtain anatomical continuity of the divided fibres without tension one has a right to look for a happy result. If such continuity cannot be obtained without the interposition of scar tissue, or without undue tension, the results will not be favourable. That is all that, to my mind, the subject of nerve surgery holds, anything

Read at the Surgical Section Canadian Medical Association, Vancouver, June, 1920.

further is simply the application of anatomical knowledge.

I should like to support this position by bringing to your notice some selected cases that have come under my own care, in which the use of a little anatomy proved of service. In the early days, before one had developed a technique for the operation, I had occasion to explore a musculo-spiral nerve just above the bend of the elbow. A friend of my own, who is an assistant surgeon at one of the London hospitals, operated with me. We exposed the musculo-spiral nerve just above the elbow and then with extreme care traced it down through a mass of scar tissue above the elbow until it dipped down between the radius and the ulna in the antecubital fossa. As the work of tracing the strand of tissue became easier I ventured to say that we were on the wrong track, the impossibility of this being upheld by my colleague. He had forgotten that the musculo-spiral nerve, in becoming the posterior interosseous, winds around the outer side of the upper part of the radius through the fibres of the supinator brevis muscle. To-day, in the light of experience, the whole incident bristles with ignorance, but ignorant we were. We had carefully and painstakingly switched from the musculo-spiral nerve, through a strand of fibrous tissue, to the tendon of the biceps. Which of you, in 1915, would have cast a stone at us?

In 1918 I operated on a case for the second time, the first operation having been performed in 1916 by a surgeon who was then writing somewhat freely on the subject of nerve suture. The sciatic was involved in the lower part of the popliteal space. I found that the internal popliteal was sutured to the external popliteal—lower part, and that the upper portion of the external popliteal was sutured to the tendon of the biceps flexor cruris. I do not make any harsh criticism. These were the early days.

Since that time the one outstanding lesson of nerve surgery has been: Make use of your knowledge of normal anatomy. A corollary, or rather a "sine qua non", of this has been the use of long incisions. See what you are doing. If the state of the lesion is such that the condition is irremediable, you have an opportunity to recognize this, and in this way to save a year or more of well intentioned and probably well applied but futile treatment. Your incision may extend from below the elbow joint to above the clavicle; its lower limit may be the popliteal space and its upper the crest of the ilium. That does not matter. Wherever you have to go to obtain free exposure, go. A former teacher of my own used to say that the finest text-book of surgery he knew was the Bible, and I have sometimes thought of this dictum of his when following a tortuous sinus. I have been reminded of the remark made by Ruth to Naomi, "Whither thou goest I will go." In dealing with nerves also, that is the only safe rule.

It would seem a truism that accurate diagnosis should precede treatment. Unfortunately, however, diagnostic accuracy is not always possible, hence the other very sensible surgical maxim, "When in doubt explore." Both positions are of course correct, although when carried to extreme the one course leads to prolonged passivity, the other to precipitate action. The only way open to a surgeon whose pride in the quality of his work keeps ahead of his operating zeal, is to make his pre-operative diagnosis as definite as possible in regard to both the site and extent of the lesion. If surgeons would only realize that from the point of view of professional *amour propre* a rose has fallen from their chaplet just as much when an operation is performed which could and ought to have been avoided if sufficient care had been taken beforehand, as when by procrastination a life is sacrificed or a useful function diminished, it might lead to greater precision of observation in the light of anatomical relationships. In this connection permit me to quote from "Disabilities of the Locomotor Apparatus", by Broca. In speaking of cases where a large part of the muscle mass has been shot away resulting in degeneration of the muscle below this level and consequent abolition of function of the joints controlled by the muscles he says:

"I have seen cases of this sort, however, in which it was proposed to explore and free the main nerves of the limb, a perfectly useless and ridiculous procedure. One of such cases was that of a patient with non-union of the shaft of the radius a little above its middle and with extensive destruction of the flexor and some involvement of the extensor muscles of the forearm: liberation of the muscle having failed to improve the use of the hand, a surgeon actually proposed, after the lapse of a few months, to explore the nerves above the level of the lesion.

Now, this constituted an error of diagnosis that is far from uncommon, although quite easy to avoid, that of mistaking loss of motor power from destruction of muscle for that of an actual

paralysis. Such a mistake can be easily avoided by a careful examination of the sensibility and of the movements that can still be carried out below the scar, by looking for the presence of trophic and vascular disturbances, and especially by determining the exact level of the wound and the relation to the points of origin of the motor branches of the nerves to the muscles affected. In the case of the patient to whom I have just alluded, there existed below the scar no sign of any nerve involvement, and the scar itself was obviously well below the point of origin of the motor branches of the median and musculo-spiral nerves to these muscles.

I have dealt with this point at length because on many of the patients' labels I have noticed this obvious error of diagnosis. In these, apparently, the existence of a nerve lesion was all the more believed in because of the electrical reactions of the lower ends of the divided muscles, but of course the reaction of degeneration is to be expected in their lower ends, which, normally almost tendinous, are now sclerosed and degenerated."

In selecting examples to illustrate the importance of anatomy, I propose to cull instances from different parts of the body. Let us commence with the lower limb. Several cases similar to the following have been encountered. Pain is complained of in the region of the medial malleolus. This pain is mainly aching in character. On examination one finds a distinct region of hyperæsthesia between the medial malleolus and the point of the heel, a region corresponding to the distribution of the medial calcanean branch of the tibial nerve. Further, just behind the prominence of the malleolus one can palpate a tender cord, somewhat thicker than it is upon the opposite, presumably normal side. I have explored several of these cases and the findings have been the same in all. The tibial nerve has been found closely invested by and adherent to a thickened sheath. The usual procedure is to dissect the sheath away completely and bury the nerve in the fat which is always present in this locality. The probable explanation is that the nerve has been bruised by being kicked by the heel of the boot on the opposite foot, at least I have been unable to suggest any other explanation. In every case, the operative measure outlined above has led to disappearance of the symptoms.

Perhaps the two most frequently injured of all the peripheral nerves are the radial, or musculospiral, and the ulnar. As a matter of clinical experience it has been found that suture of the musculospiral nerve has a rather better prognosis than that of many other nerves. On the other hand, when suture is attempted of the posterior interosseous, the result has been uniformly disappointing. I am not prepared to say definitely why this is so, but again as a matter of experience one finds that when it is necessary to suture a nerve just above its division into a number of branches, the outlook is not very good. Such is the case for instance when suture of the external popliteal nerve is carried out just above the level of the neck of the fibula before its division into anterior tibial and musculocutaneous portions. In the case of the posterior interosseous, its division into six or seven branches is almost immediate, being completed before the exit of the nerve from the supinator brevis muscle. Indeed the dorsal interosseous nerve is no more than a fine thread which ends on the back of the carpus in a gangliform enlargement from which tiny branches pass to the carpal joints. So definite is one's present opinion on the uselessness of trying to repair a posterior interosseous lesion that one would now waste no time over it. One would immediately perform a tendon transplantation permitting of return to work with a very useful hand in six or eight weeks' time, instead of staking a year or so on the problematical recovery of the extensor muscles after suture of the posterior interosseous.

Pte. W. was operated on on August 28th, 1919, the musculo-spiral nerve being completely lacking in function. At operation the nerve was found embedded in bone at the site of the fracture, about three inches above the elbow joint. After resecting the minimum amount it was found that the ends could not be approximated without some tension. A union was made, with the decision to perform a tendon transplantation at a later date. As there was insufficient evidence of regeneration, a tendon transplantation was done on March 11th, 1920. On April 1st, the retaining plaster was removed, and functional exercises instituted.

Cases of lesion of the ulnar nerve are exceedingly common and are easily recognized as a rule. The attitude of the hand is typical. The ring and little fingers show hypertension at the metacarpo-phalangeal joints and flexion at the interphalangeal joints. This deformity of claw-hand is always more pronounced if the injury to the nerve is below the upper part of the fore-

arm than if it be above the elbow joint. The reason is one of pure anatomy. I have often been asked what is the mechanism of the claw-hand. Three groups of muscles are involved: (1) the extensors of the fingers, (2) the interossei and lumbricals, (3) the flexors of the fingers. Let it be remembered that the function of a muscle is to approximate its attachments, not primarily to flex or extend a joint, and the mechanism is clear.

The extensors are in action, the flexors are in action, the interossei and lumbricals are out of action. The extensors of the fingers are inserted into the common extensor expansion on the dorsum of the first phalanx. It is no part of their function to extend the two terminal phalanges except through the medium of the common extensor expansion.

The lumbricales and interossei act as guy ropes to keep the metacarpo-phalangeal joints in partial flexion, or at least in the straight line, and through their insertion into the extensor expansion, keep the two terminal phalanges in full extension. When their influence in this direction is removed the extensors of the fingers approximate origin and insertion to their utmost and thus hyper-extend the metacarpo-phalangeal joints. The extending influence of the interossei and lumbricale being removed, the flexors of the fingers find themselves confronted with little opposition and thus exaggerate the flexed condition of the two terminal phalanges. But, you may ask, "Even if the flexors of the fingers are out of action why does some degree of flexion occur?" The reason is simply that partial flexion is the natural position assumed by these joints when under no muscular influence whatever. It will now be evident why it is that a low lesion of the ulnar nerve is associated with a greater degree of claw-hand than a high one. In the high lesion the ulnar portion of the flexor profundus digitorum is out of action and this degree of flexion is simply that of natural joint conformation. When the ulnar portion of the flexor profundus digitorium is acting practically unopposed it increases the degree of flexion enormously. It will also be obvious from this reasoning why a patient with a moderate degree of claw-hand from a high ulnar nerve lesion should frequently think his condition is getting worse instead of better after nerve suture. The branch given off by the nerve to the flexor profundus digitorium takes its origin a short distance below the elbow joint, and is thus not infrequently among the earliest branches to show recovery. The disabling factor in an ulnar nerve lesion is essentially the hyperextension at the metacarpo-phalangeal joint. If this be overcome by preventing the first phalanx going backward, almost full extension of the fingers can frequently be carried out. My attention was called to this by a patient with a low ulnar nerve lesion, who wish d to play the piano. In an attempt to secure this a splint w s devised on the following lines: a light splint of German silver is made to fit the ulnar border of the hand. It extends proximally to just distal to the carpo-metacarpal articulations. Distally it extends to a line just short of the proximal interphalangeal joints of the little and ring fingers. Opposite the metacarpo-phalangeal range it is bent, forming an angle open forwards. From the ulnar border a stouter flange bends round into the palm just proximal to the metacarpal head ending in line with the head of the second metacarpal bone. It is an easy matter to secure this with a tape or a dome fastener, and with the splint in position comparatively little restriction of extension is observed. The splint is exceedingly light and has been, for the most part, much appreciated by those who have used it. Should the lesion involve both median and ulnar nerves it is only necessary to make the dorsal flange sufficiently extensive to cover the four ulnar metacarpo-phalangeal joints.

While we are dealing with the ulnar nerve, another small point comes up for mention. In lesions of the nerve below the elbow one often finds that it would be possible to bridge a gap, provided the nerve could be displaced in front of the elbow joint, but unfortunately we find that two branches come off just below that level; the branch to the flexor carpi ulnaris, and the branch to the flexor profundus digitorium. Now these can be preserved. It is always possible to see them and dissect them free, if one knows they are there and looks for them. Should it be necessary a good deal of additional length can usually be obtained by following the branches into the substance of the corresponding muscle. Moreover one does not hesitate to sacrifice deliberately the ulnar flexor branch if that be essential to obtaining a union without tension.

The case of Pte. G. B. is illustrative of this. The scar of the original lesion is a short distance proximal to the wrist joint. My operation notes under date of October 10th, 1919, are as follows:

"Left ulnar exposed in lower part of forearm. After resection, a gap of four and a half inches was present. The nerve was displaced in front of the internal condyle. The branch to the flexor carpi ulnaris was seen and preserved as was that to flexor profundus digitorum. A fair amount of scar tissue was present in the bed of the union. The elbow and wrist were kept flexed in plaster for six weeks. Stitches were then removed. Partial flexion was maintained for two weeks more. At present date—April 7th, 1920—there is distinct recovery of protopathic sensibility over the former area of anæsthesia and there is tenderness of the hypothenar eminence and the interosseous muscles which is highly suggestive of regeneration."

A very interesting lesion of the ulnar nerve came under my care some time ago, which to my mind is sufficiently rare to merit being recorded. The complaint was of weakness and awkwardness in the left hand. There was no loss of sensation and no atrophy of the thenar or hypothenar eminences. There was, however, some atrophy of the interossei. This was, I believe, a case of pressure neuritis of the ulnar nerve in the palm of the hand. The patient was a butcher, and his work involved skinning over 100 cattle per day. In the process the hide was grasped firmly with the left hand, the fingers, especially the middle and ring fingers, being tightly clenched, while with the right hand the integument was detached from the subjacent soft parts. Since relinquishing this particular form of activity the patient's disability is steadily improving.

Having considered one or two points in relation to the nerves of the upper limb, let us turn for a moment to some examples from the head and neck. Several cases have come under my care, suffering from gunshot wound of the neck, where tenderness was extreme in the area of distribution of some of the cutaneous nerves. These were treated for the most part by resection of the cutaneous branches involved. When it was possible to perform the section at a higher level than the scar tissue it was possible to overcome the subjective pain as well as the tenderness. When that was impossible, relief from tenderness at the cost, it is true, of ordinary sensation was obtained. One of the most striking cases of this character was the following:

Pte. T. E., on March 23rd, 1918, sustained a gunshot wound of the right side of the neck. He presented a rather remarkable appearance. One half of his neck was shaved and clean, the other was unshaven and had not been washed for a long time. The tenderness was extreme. He could not bear the slightest touch over an area extending over the right mastoid process and adjacent part of the scalp forward to the middle line of the neckm and downwards over the clavicle to about the level of the second intercostal space. About the level of the middle of the right sterno-mastoid, and just in front of that muscle, there was a sinus which was discharging freely. A diagnosis was made of sequestrum of one of the cervical vertebræ, and scar tissue involving the cutaneous branches at least of the cervical plexus. These, it will be remembered, emerge from behind the sterno-mastoid muscle and radiate in various directions. Passing upwards along the sterno-mastoid muscle —posterior border—is the lesser occipital nerve from the second cervical. Running obliquely forwards and upwards towards the mastoid process is the great auricular nerve from second and third cervical. Passing transversely forwards is the nervus cutaneous colli—the transverse cervical of the old terminology. In a downward direction there course the three groups of supra-clavicular descending branches from third and fourth cervicals.

At the operation on November 7th, 1918, the sinus of the neck was opened up and the sequestrum removed. A separate incision was then made along the posterior border of the sterno-mastoid muscle, and all the cutaneous nerves were identified, as were also the spinal accessory nerve and a communicating branch to it from the third and fourth cervical nerves. Portions of the small occipital, of the great auricular, of the transverse cervical and of the descending supra-clavicular nerves were removed. The result, from the first, was gratifying. The tenderness disappeared entirely and the subjective pain was much diminished. The wound behind the sterno-mastoid healed at once, and the discharge from the anterior wound diminished, although it did not cease for a considerable time, the reason being that a pocket had formed between the bodies of the lower cervical vertebræ and the prevertebral fascia. This was identified by bismuth injections. With some difficulty a demand for further operation was resisted and the sinuses ultimately closed. The result has been as gratifying to the patient as to the surgeon. This case is interesting inasmuch as it brings into prominence the great importance of cutaneous nerves, structures rather despised and

rejected of the student of anatomy because they are at times hard to find. In resecting cutaneous nerves it is not enough merely to cut them across. A full inch ought to be removed. If they are merely sectioned they will certainly re-unite, a circumstance fortunate enough for most of us.

Mr. L. T., a locomotive engineer, was compelled suddenly to reverse his engine. The movement required that he exert every ounce of his strength. He felt something give on the left side of his neck. This was followed by some pain at the spot which, however, soon disappeared and was not felt for several months. He now feels discomfort at times in the thumb, forefinger and middle finger of the left hand. When certain movements of the left arm are performed, these movements not being very definite in direction and not requiring any special degree of force, a tingling sensation passes through the three digits mentioned. These correspond to the sensory supply of the median nerve to the fingers and the fibres composing them come from the eighth cervical root. An *x*-ray was taken of the lower cervical spine and shows a fracture of the left transverse process of the seventh cervical vertebræ. Here at once is the explanation of the condition. The transverse process has been torn from its attachment by some of the muscles attached to it, probably the scalenus medius and posticus. The displacement is just sufficiently great for it to impinge during certain movements upon the eighth cervical nerve as it comes out below the seventh cervical vertebræ, but not sufficiently pronounced to cause atrophy of the muscles supplied by these fibres or even continuous pain from pressure.

Another somewhat interesting case, illustrating the close correlation between sensory and motor nerves is that of Lieut.-Col. H. A large shell burst close to his right side and various fragments of it caused wounds of different degrees of severity. Among others he had a small scar on the right cheek which was at first passed by as of no importance. He complained, however, of lacrimation of the right eye, when it was exposed to cold, to wind or to bright sunshine. There was also hyperæsthesia of the skin of the right cheek and right upper lip, and of buccal mucosa on the right side. There was no paralysis or atrophy of muscles of the right side of the face, but there was a constant spasmodic twitching along a line from the malar bone to the right angle of the mouth, a line which corresponds to the zygomaticus muscle. Apparently there was scar involvement of branches of the infra-orbital nerve coming from the maxillary division of the trigeminal and also of the buccinator branch of the mandibular portion of the fifth nerve. This resulted in hyper-excitability of the branches of the same nerve which supply the conjunctiva, and consequent on this, increased activity of the lacrimal gland. At the same time at least one of the facial muscles, the zygomaticus, became more excitable, resulting in a spasmodic twitching analogous to that found in spasmodic torticollis. Through a small incision the zygomaticus muscle was identified and its fibres divided transversely. The result was immediate and complete abolition of the spasm. Suitably tinted glasses afforded some diminution in the intensity of the stimuli applied to the conjunctiva. The result was fairly satisfactory.

The advantage of precise anatomical knowledge is not confined to the surgery of peripheral nerves. Some years ago a friend came to me asking for a demonstration of the Anatomy of the Temporal Bone. I enquired what in particular he desired. "Well, you see," he said, "it's this way. Out on the northwest frontier of India where I am, I've to do all sorts of things, and lots of the natives come along with mastoids. I operate on them, and the beggars are awfully grateful and all that sort of thing, but they all get facial paralysis." The complication alluded to is not restricted to the North West frontier of India, indeed several cases have occurred in Canada. With the most careful technique an accident may happen. Sometimes the condition occurs quite apart from operation. Sometimes, as in a case following extirpation of the cochlea, it may be necessary to sacrifice the facial nerve deliberately and of set purpose. Whatever be the cause, the disability is a serious one and anything which will improve the resulting deformity is worth serious consideration. The opportunity of attempting to improve this deformity has been presented to me in some seven cases, and five of these are of sufficiently long standing for one to hazard some opinion as to the value of operation. Let me quote one case by way of illustration.

Mr. J. S., aged thirty-eight, consulted me on December 5th, 1918, complaining of facial paralysis involving the right side of the face. The onset was gradual about seven years before this. During the last four years the condition

had been very noticeable. There was no history of operation nor of suppuration in the middle ear. On examination there was found complete facial paralysis on the right side with extreme atrophy of the facial muscles, drooping of the lower-eyelid and of the angle of the mouth. There was no paralysis of the soft palate, and no atrophy of the tongue. Knee jerks were present on both sides and were not exaggerated. The Wassermann reaction was negative. Electrical reactions of the facial muscles were tested. These showed no response to Faradic stimulation, but some response to the Galvanic current.

A special report on the condition of the ears was as follows:

"Examination shows 'otitis media catarrhalis chronica' in both ears, worse in the right ear with involvement of the seventh and eighth nerve in right ear. Lesion of both nerves, probably in the internal meatus."

Having regard to the hopeless prognosis in this case, one advised that an attempt be made to transfer the central end of the hypoglossal to the distal part of the facial nerve. This was done on January 13th, 1919. It is possible to obtain union of these nerves without any tension, if the facial nerve be followed up to the stylo-mastoid foramen, and if the hypoglossal be cut off at the anterior border of the hypoglossus muscle, just before it breaks up into a leash of branches. The branch to the thyro-hyoid, and the descendens hypoglossi are seen and usually have to be sacrificed. No disability is noticed in these cases, as a direct result of section of those two branches. Paralysis of one half of the tongue is immediate and is permanent. This, however, causes almost no inconvenience. For a week or two the speech is rather thick, and when the tongue is protruded it does not go forward in the middle line; but atrophy commences at once, and after a few months have elapsed no difference from normal, as regards function, is observable. Some use the accessory nerve in preference to the hypoglossal, but the latter seems to me to be preferable. Massage of, and light Galvanism to, the facial muscles was instituted at once and improvement began to show itself in a short time. The patient now has voluntary power in most of the facial muscles and with the face in repose the paralysis is not at all noticeable. When he smiles, of course, the normal muscles make the discrepancy between the two sides very evident. Improvement is still taking place, although I cannot predict to what extent recovery will actually occur. Even if no further gain is made, the change is sufficient to justify the operation.

In five out of the seven cases, voluntary power is present to some extent. One is therefore justified in concluding that the operation has a distinct place in surgical therapeusis.

The plea submitted in this paper is the importance of precise anatomical information in regard to peripheral nerve lesions, but it is in reality a wider plea than that. It applies to all our surgical problems. True, one can perform a great deal of useful work with a modicum of anatomical knowledge, but it is in dealing with cases that are somewhat out of the beaten track, where one does not recognise the condition as something one has seen before, that anatomy is of so much importance. It lends a confidence to one's actual work, and prevents many a shock when the patient has recovered from the anæsthetic. One has seen, for instance, paralyzed spinati muscles not infrequently after removal of glands from the posterior triangle of the neck, and a wrist drop which did not exist before operation has been present after an operation on the humerus. "There is nothing new under the sun," and the motive of this paper is simply the ancient adage, "Man, know thyself."

THE SURGICAL TREATMENT OF CHRONIC INFECTED OPEN PNEUMOTHORAX

FRASER B. GURD

Major C.A.M.C. (Officer in Charge of Surgical Division, Ste. Anne de Bellevue Military Hospital)

SINCE October, 1918, the majority of cases of chronic discharging chest cavities among soldiers and pensioners in Eastern Canada have been admitted to the surgical service at the Ste. Anne de Bellevue Military Hospital. Through the kindness of Drs. J. M. Elder and E. M. Eberts, two cases in the Montreal General Hospital have been placed under my care. From these two sources, the author has had the opportunity of studying twenty-five cases of chronic chest sinus.

Eleven cases followed gunshot wounds of the chest; thirteen were the result of post-pneumonic empyema; one was due to tuberculosis of the sternum.

The average duration of the discharging sinus prior to admission to our service, was over fifteen months. The shortest had been suppurating for four months; the longest for four and one-half years.

In eleven cases (Table I) the cause of the persistent sinus was found to be of a trivial nature, such as the presence of sequestrum, or other foreign body. In the remaining fourteen cases (Table II), the intrathoracic cavity was of sufficient size to demand treatment of the cavity as such. The average duration of the latter group of cases, prior to admission was seventeen months.

Of these cases, one large basal cavity (500 c.c.) No. 12, healed promptly, following the institution of adequate drainage and the removal of a fragment of dead bone. One case, No. 13, healed after the employment of bismuth paste (Beck). Hypochlorite irrigations resulted in obliteration of large cavities in two cases. In the remaining ten cases, decortication or pneumolysis of the fixed lung was carried out. The average duration of the disease prior to attempting radical operation was twenty-three months. Twenty-six months after the commencement of this study, the results are as follows: Twenty-two cases are cured; one was discharged from hospital, with persisting sinus; one patient died; and one is still under treatment. The determining cause of persistence of the sinus was judged to be:

Dead bone or osteitis, 6 cases; projectile (liver, lung hilus), 2 cases; rubber drain, 2 cases; suture (silk worm gut), 1 case; insufficient drainage, 2 cases; fixation of cavity, 11 cases; bronchial fistula, 1 case. (Bronchial fistulae were present in five cases, but in four did not appear to be the chief cause of the persisting cavity.)

Upon admission to hospital, all patients have been subjected to rigorous examination, both as regards their general constitutional state, and more particularly regarding the function of, and pathological condition in the chest. This examination has included stereoscopic *x*-rays, and occasional fluoroscopic examinations, to note fixation of lung and function of diaphragm.

The thorax has been examined for mobility and by means of percussion and auscultation in order to demarcate the cavity in so far as possible, and in order to have information available, which might be of value in following the progress of the case.

During the first two or three weeks following admission of the case, we have been content to remove all drains, if such were present upon admission, and to attempt to guage the general physique and resistanee of the patient, in order that we might be able better to decide what type of operation, if any, was indicated. During this period of observation, everything possible has been done to increase the strength of the patient, to improve his weight, and to diminish his anæmia. Efforts have been made to have him employ blow bottles, or foot-ball bladders in order to improve the function of the chest. Graduated exercises in the gymnasium have been ordered, and for those cases, whose general health justified more severe exertion, canoeing

and cross-country walking have been recommended.

Two cases (Nos. 4 and 9) have been followed by prompt permanent healing of the sinus, as soon as the drain was removed from the side. In other cases, in which the cavities appeared to be small, discontinuous irrigations with hypochlorite solutions (Dakin's or Eusol) have been employed in the hope of assisting in the sterilization of the cavity.

In several cases, great discomfort was caused our patients, as the result of the chlorine solution entering bronchial fistulæ. In consequence, we have made a habit of commencing irrigation of cavities very cautiously, and employ saline solution before proceeding to the use of the more irritant chlorine solution. Oxygen irrigations as recommended by Tuffier[1] have not been tried.

In cases of pyocyaneus infection, we have taken advantage of the recommendation of Taylor[2] regarding the use of acetic acid. The prompt control of this troublesome infection by the use of a solution containing one to one and a half per cent. acetic acid has, in these chest cases, as in other cases in which it has been used, proved very satisfactory.

In cases of smaller cavities, which have not promptly responded to removal of foreign substance, such as drains, sequestra, etc., followed by hypochlorite irrigations, we have employed injections with Beck's paste. In general, it may be stated that our experience in the use of this paste has been extremely satisfactory. Several cases have promptly healed and remained healed for many months, we believe permanently. In no case has the injection been followed by untoward results. The employment of Beck's paste, after the manner recommended by its originator, is heartily endorsed by the author.

Previous experience[3],[4] in the use of Rutherford Morrison's technique, and the employment of his bismuth iodoform paraffin paste (B.I.P.P.) has induced us to make use of his technique at operations upon infected chests.

It has been our custom after completion of whatever operative interference was deemed necessary or advisable in the individual cases, to dry the surface of the wound by the employment of alcohol, and to rub the surface thoroughly with a thick B.I.P. paste. All excess is carefully rubbed off, and the remaining cavity tightly in the smaller cavities, less tightly in the larger cavities, packed with gauze wrung out of liquid paraffine, to which a small amount of B.I.P.P. has been added.

In the employment of B.I.P.P., the possibility of poisoning must, of course, be borne in mind. The author has elsewhere stated that if less than one square foot of tissue be exposed to the paste, the danger of any important poisoning is, in his opinion, absent. Not infrequently the total area of chest cavities is very considerably greater than one square foot. In such cases, the application of the paste should be made to those areas only in which foci of infection are to be most dreaded. Too great stress cannot be laid upon the proper technique in the use of the paste.

Although our results from the employment of the hypochlorite solutions, have not been so spectacular as those reported by Depage[5], Graham[6], and others, we have had two cases (Nos. 15 and 23), of large, almost complete cavities, of five and eighteen months' duration respectively, which have permanently healed, following frequent irrigations with Dakin's solution. This technique should always be attempted, either in lieu of, or in preparation for, more radical procedures.

In consequence of the marked thickening of the parietal pleura, which is present in all long-standing cases of open pneumothorax, both radioscopic and physical examination are usually of relatively little value in determining the shape and extent of the cavity. A generous rib resection, and visual and manual exploration of the cavity are usually necessary for this purpose, as well as for the proper administration of hypochlorite irrigations.

One case (No. 10) was discharged from hospital with a persisting sinus. This case was the result of a gunshot wound of the chest. The projectile was situated behind and close to the base of the heart. The sinus, which discharged through an opening in the lower part of the sternum, ran irregularly upwards and inwards. At operation a large trephine opening was made in the sternum about the sinus and the heart exposed. This organ, however, prevented a further view of the sinus, and the projectile, which was small, measuring apparently 1 x 5 c.m. in size, could not be palpated. The patient was kept under observation following this operation for eight weeks, and discontinuous irrigations with eusol were employed. In as much as the patient's general condition was good, and the discharge scanty, he was discharged from

TABLE I

PERSISTENT SINUS DUE TO CAUSES OTHER THAN EXTENSIVE CAVITY

No.	Case	Original Cause	Duration in Months	Description	Procedures Employed	Result
1	A.R.F.	G.S.W.	18	Exfoliated rib. Small cavity	Sequestrectomy, B.I.P.P.	Cured
2	U.O.G.	G.S.W.	12	Osteomyelitis of rib, extensive	Excision, B.I.P.P., suture	Cured
3	M.R.A.	.....	6	Tuberculosis of sternum	Excision, B.I.P.P., suture	Cured
4	E.T.S.	Empyema	24	Drainage tube, small cavity	Removal tube	Cured
5	I.E.W.	G.S.W.	9	Sequestrum, small cavity	Sequestrectomy, B.I.P.P.	Cured
6	H.W.	Empyema	10	Abscess chest wall, small cavity	Improved drainage, B.I.P.P.	Cured
7	L.A.W.	G.S.W.	9	Exfoliating osteitis of scapula	Partial resection, B.I.P.P.	Cured
8	I.H.T.	G.S.W.	14	Scar tissue chest wall, small cavity	Excision	Cured
9	A.C.	Empyema	8	Drainage tube, small cavity	Removal tube	Cured
10	H.W.	G.S.W.	18	Projectile in lung hilus	Improved drainage, discontinuos irrigation	Discharged from hospital
11	L.E.G.	G.S.W.	17	Closed pneumothorax, buried silk-worm gut suture	Removal suture in excised scar	Cured

TABLE II

PERSISTENT SINUS ACCOMPANIED BY LARGE CAVITY

No.	Case	Original Cause	Duration in Months	Size of Cavity (estimated)	Description	Procedures Employed	Result
12	R.E.B.	G.S.W.	15	500 c.c.	Rib sequestrum, cavity at base	Sequestrectomy, improved drainage, B.I.P.P.	Cured
13	O.C.	G.S.W.	12	200 c.c.	Bronchial fistula	Beck's paste	Cured
14	R.C.	Empyema	8	600 c.c.	Dense walled cavity at base	Decortication, complete visceral. Later sequestrectomy	Cured
15	O.McR.	Empyema	18	500 c.c.	Apparently dense walled cavity in upper part of chest	Improved drainage, Dakin's solution, Beck's paste	Cured
16	D.McD.	G.S.W.	18	300 c.c.	Large projectile in liver. Dense walled cavity. Bronchial fistula. Pyocyaneus infection.	Removal F.B. Improved drainage. Partial decortication. Acetic acid irrigations. Beck's paste	Cured
17	M.McD.	Empyema	30	Almost Complete	Fixed cavity including apex. Bronchial fistula. Interstitial fibrosis of lung	Improved drainage. Decortication, complete visceral (no expansion). Plastic operation (Beck). Collapsing thoracoplasty extensive	Still under observation
18	S.McM.	G.S.W.	12	150 c.c.	Sinus anterior; cavity posterior	Dissection of sinus. Partial decortication	Cured
19	A.R.G.	Empyema	34	300 c.c. 800 c.c.	Two large mixed cavities, one situated anteriorly over base, and one posteriorly involving upper part of chest	Decortication of both cavities at separate operations. Partial collapse of chest wall	Cured
20	H.C.S.	Empyema	8	100 c.c.	Small very dense walled cavity; abscess of soft parts	Decortication. Incision, B.I.P.P.	Cured
21	A.E.R.	G.S.W.	9	Almost Complete	Fixed cavity involving apex of chest. Old Carrel tube in apex of cavity. Bronchial fistula	Removal F.B. Decortication complete, visceral	Cured
22	J.E.D.	Empyema	15	150 c.c.	Apex involved. Bronchial fistula. Extreme emaciation. Nephritis. Institial fibrosis of lung	Improved drainage. Partial decortication (no expansion). Adequate operative interference not attempted	Died (Nephritis)
23	G.D.	Empyema	5	Complete	Dense walled cavity, half-filled with pus	Wide thoracotomy. Dakin's solution, frequent irrigation	Cured
24	R.O.H.	Empyema	4	1000 c.c.	Apparently fixed cavity, base and upper part of chest	Decortication, complete visceral	Cured
25	B.C.	Empyema	54	Complete	Fixed cavity, marked deformity	Decortication, complete visceral	Cured

hospital in order that he might engage in civil occupation.

In one case (No. 13), the usefulness of Beck's paste injection was exhibited in a spectacular manner. The patient, who has suffered from an empyema following gunshot wound of the chest twelve months previously, was admitted to hospital with a sinus discharging moderate quantities of thick creamy pus. Bronchial fistulæ was evident; the size of the cavity which was irregular in shape was shown by radiograph to be 7 by 5 centimeters in diameter. Despite the pulmonary fistulæ, the cavity was, for the purpose of radioscopic examination, injected with bismuth paste. The patient coughed up a considerable portion of the injected paste, during the injection and for the ensuing four or five days. The sinus, nevertheless, closed almost immediately and remained closed for a period of two months when, owing to his excellent general condition, he was discharged from hospital. Radiographs made at the time of his discharge showed that he still retained in his chest a small portion of the injected paste.

In the author's opinion, the operation of decortication should be undertaken if, after the induction of adequate d ainage, the removal of foreign bodies and the conscientious employment of hypochlorite irrigation, the obliteration of the cavity and arrest of suppuration are not accomplished within three or four months.

The operation of decortication is not difficult, provided adequate exposure of the chest cavity, and a dry field is obtained. This latter desideratum is largely a question of a suitable packing and refraining from undue haste. The results reported by Tuffier[7], Lilienthal[8], Hedblom[9] and others, as well as those of the author, prove that the mortality is very small. The operation is not a mutilating one, in fact, not only is function much increased, but deformity is to a very considerable degree overcome.

The esults of the operation with rega d to the elimination of open pneumothorax, and the arrest of infection and consequent suppuration, have been most gratifying.

In long standing cases of large suppurating cavities, the extreme degree of dense thickening of the parietal pleura (in one case 2·0 centimeters) together with the approximation or overlapping of the ribs, renders the ordinary intercostal thoractomy incision with the use of a rib spreader inadequate to permit satisfactory exposure for decortication. Although Tuffier reports that in his hands this incision has proved sufficient, the author has found a more radical method of approach necessary in all long standing cases.

Depending upon the thickness of the parietal pleura and the amount of overlapping of the

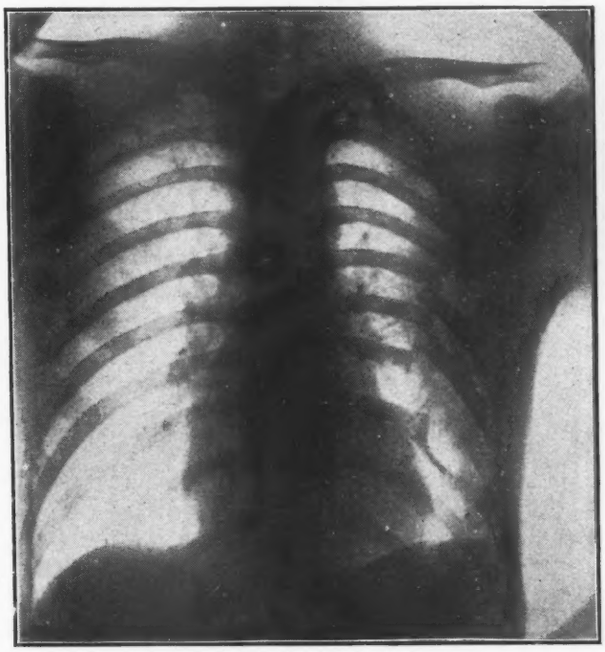


Fig. 1. Radiograph Case 24, one month after operation,—decortication. Sound permanent healing had occurred by this time.

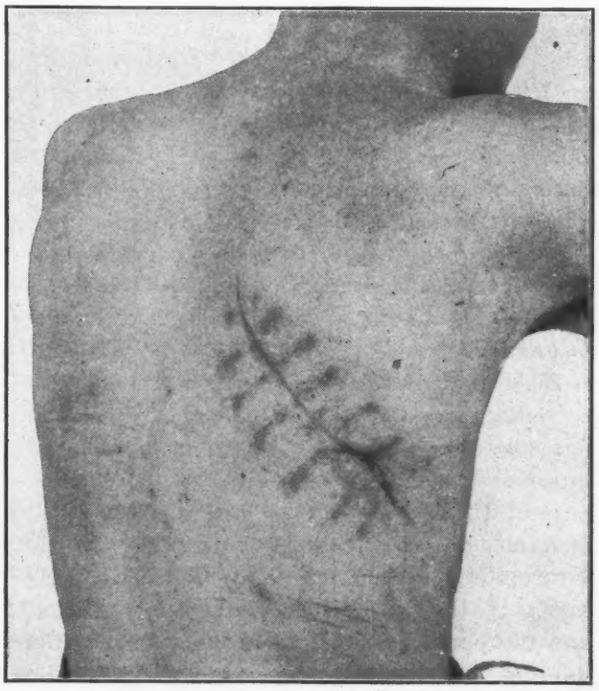


Fig. 2. Photograph Case 14, two weeks after operation. A secondary operation for removal of small exfoliated rib fragment was afterwards necessary.

Fig. 3. Photograph Case 19, one month after operation on posterior cavity. A small bone fragment was afterwards removed.

ribs,—resection of the whole length overlying the lower portion of the cavity of one, two, or three ribs together with the intercostal tissues and the underlying pleura has been found necessary. In addition, the suggestion of Lilienthal of sectioning three or more ribs at their posterior ends, upward from the point of entrance into the chest has been made use of. The ribs from the tenth to the fourth, have been thus cut in several cases. In no instance have I found it necessary to section the second or first ribs. The recommendation by the same author (Lilienthal) that Liston's bone cutters be used instead of the ordinary costotome, simplifies the division of the ribs, and I believe, minimizes hæmorrhage.

When the ribs are removed, or cut, and the intervening soft tissues are divided, there occurs immediately profuse bleeding from the cut intercostal vessels. Owing to the cicatrical denseness of the chest wall the effective application of hæmostats and ligatures is extremely difficult. Fortunately, neither procedure is usually necessary. If the cut surfaces are firmly packed, and the packs left undisturbed for three or four minutes, the bleeding stops, and a dry field is obtained for the intrathoracic part of the operation.

Continued open pneumothorax accompanied as it always is, by infection and consequent inflammatory reaction, results in marked thickening of the parietal pleura, and the formation over the compressed lung, the pericardium (if the left chest be involved), and the diaphragm, of an organized membrane of variable thickness. This covering is always dense, and since it is intimately attached to the parietes throughout its entire periphery, prevents expansion of the lung, and opposes to the almost non-collapsible outer chest wall, an inner surface equally inelastic. Not only, indeed, does this inner lining confine the lung to its early collapsed position, but by virtue of the inherent tendency of newly formed collagenic tissue to contract with the passage of time, the lung is further displaced toward the mediastinum.

The thickened layer of tissue over the visceral is never as thick as that over the parietal pleura. Even in very long standing cases, two to four years, it does not measure more than two to four millimeters in thickness if the surface has been rendered free from fibrin by the adequate employment of hypochlorite solution.

It must be noted that the confining membrane does not represent a thickening of the visceral pleura itself, but merely an overlying dense fibrous tissue covering. A line of cleavage between the two membranes is present, and if this line be found at operation, decortication of the entire superficial surface of the lung is usually easily accomplished. Not infrequently the visceral pleura has been destroyed over several small areas measuring from one to one and a half centimeters. In consequence, it is impossible to strip off the covering of the lung. If such be the case, either an artificial line of cleavage may be made with the scalpel and a small area of fibrous tissue covered pleura allowed to remain, or as has most frequently occurred in the author's experience, these adherent spots are not recognized until the pleura, and the more superficial layers of the lung have been torn off. The black looking tissue so exposed, soon commences to bubble air, and may at first bleed profusely. In my experience, this hæmorrhage is promptly arrested by pressure and does not recur. At no time has the author found it necessary to apply a ligature. In one case (No. 17), these adhesive areas were very extensive, with the result that over an area of approximately the size of the palm of the hand, the pleura was removed without untoward result.

The apical portion of the lung is difficult to

expose properly without resection of the first and second ribs. This is time consuming and may be mutilating, and has not been undertaken by the author. Without complete visual exposure, the excision of the membrane is not without danger. The author has been content to simply split the membrane longitudinally cutting from the lung outward, and to separate the membrane as far as the chest wall, leaving those parts of the membrane that could not be drawn into the field of vision lying loose.

The covering over the pericardium is readily separated; that over the diaphragm is usually more adherent. Care should be taken not to injure the latter structure. In so far as the membrane can be removed without injury, this should be done, otherwise it should simply be incised. Such incisions are better made parallel to the muscle fibres.

If the preliminary irrigation of the chest has failed to reach any loculated foci, and infection of the wound is feared, the latter is "bipped" prior to closure, and a "bipped" paraffin gauze drain is placed in the cavity and drawn through the dependent portion of the thoractomy wound. If infection appears to have been adequately controlled B.I.P.P. is not used, and simply a small paraffin gauze drain is inserted.

The wound is closed in layers,—but few cat-gut sutures are necessary, or desirable, although the divided latissimus dorsi and the scapular muscles should be carefully coapted.

After operation, the patient is propped up in bed; morphine is freely administered during the first forty-eight hours, after which time the patient suffers but little. The gauze drains are removed at the end of forty-eight hours, and the patient is induced to cough, and to increase the intrapulmonary pressure by blow bottles or a foot-ball bladder. As soon as possible, he should be out of bed and breathing and general exercises begun.

In but one case in our series was it not possible to obtain sufficient inflation of the lungs to obliterate the cavity. This patient suffered from a large bronchial fistulae, which rendered hypochlorite irrigations impossible. This, perhaps, interfered in part with the usefulness of the operative procedure. In this case a plastic operation, as described by Beck[10], was attempted four years after the onset of the disease. Two large flaps were turned into the cavity, and for three weeks the appearance of the wound suggested that a successful outcome might be hoped for. Unfortunately, however, he developed a severe influenzal infection, and although he survived, the extra demands upon his tissues sufficed to arrest all reparative power, and the wounds opened up.

As all available tissue had been employed at the

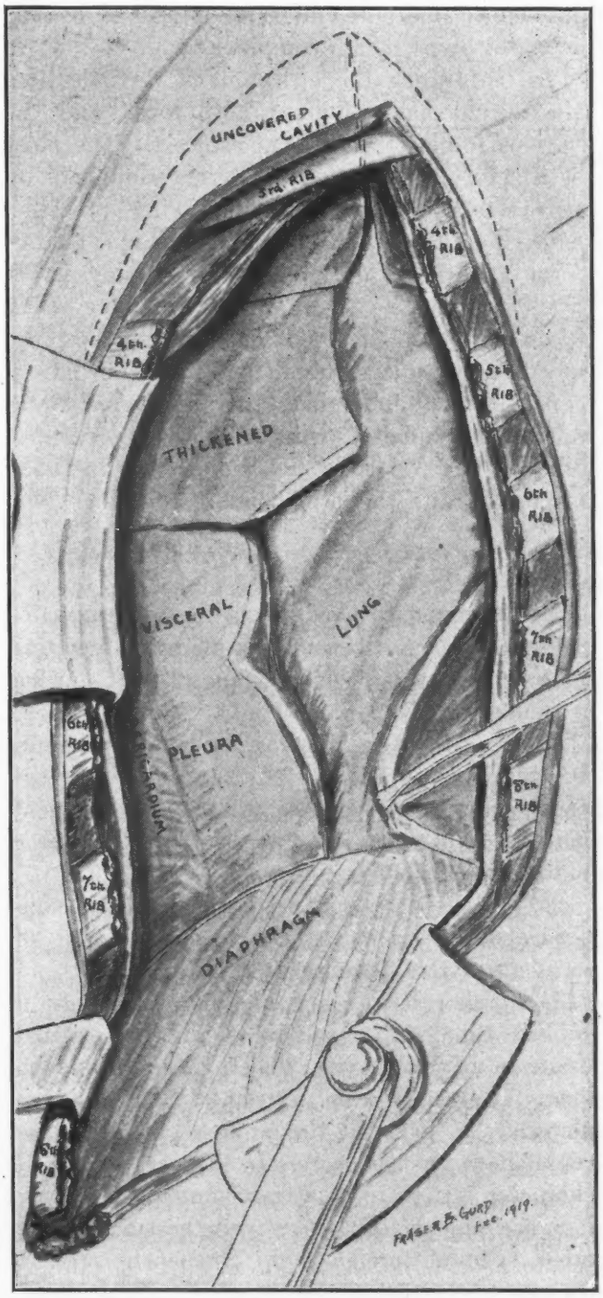


Fig. 4. (Fig. 8 in previous manuscript). Semi-diagramatic drawing of operation in Case 21. Illustration shows the adequate exposure of cavity and decortication of the lung partially completed. Although the chronic open pneumothorax has persisted for over one year prior to pneumolysis, the enveloping membrane was removed comparatively easily. (Drawing is approximately $\frac{2}{3}$ natural size).

preceding operation, it was necessary to attempt a more completely collapsing procedure. This was undertaken, and all the ribs from and including the second to the tenth, were removed from close to the spine, as far outward as the mid, or anterior, axillary line. The last operation was performed four months ago, and although it is hoped that cure will be accomplished, healing is as yet by no means complete.

In performing the operation of decortication, the author has employed both local, and the various forms of general anæsthesia. The most satisfactory results have been obtained by paravertebral nerve blocking with procaine, assisted by the use of chloroform. Light chloroform anæsthesia only has been employed. It has been our aim to retain the coughing reflex in order that in the event of injury to the lung, any hæmorrhagic material might be immediately expectorated, and that the uncovered lung might be inflated while under observation. For the latter purpose, we have found methods of pressure anæsthesia inadequate.

Summary

Extrapulmonary cavities in the thorax continue to exist and become chronic with resulting persistent sinsues for one or more of the following reasons:

1. The drainage opening is not dependent. In consequence, there is always present in the chest cavity a residual amount of purulent material which acts as a foreign body and is a nidus for bacterial growth.

2. The drainage opening is too small; in consequence there is always a certain amount of purulent material dammed back.

3. Foreign bodies are present; commonly a rubber tube drain employed in the original drainage of the cavity is left in position too long. It is advisable to remove all drainage material as soon as the amount of discharge commences to decrease, or to become serous in character. If there be a re-accumulation of pus, it is a simple matter to re-open the sinus. The other type of foreign body frequently present consists of sequestra, the result of exfoliation of rib ends following resection. Occasionally an infective osteitis is present.

4. A communication between the bronchial tree and the pleural cavity, pleuro-bronchial fistulæ, is a not infrequent cause of renewed infection of the pleural cavity, and consequent persistence of the condition of open pneumothorax.

5. Dense fibrous membrane formation over the pleura, accompanies persistent pneumothorax and continued suppuration. This membrane binds down the lung so that expansion of the l tter is impossible.

6. Occasionally interstitial fibrosis of the lung tissue takes place, which further in erferes with lung expansion.

The following is an outline of procedures which may profitably be employed in the treatment of discharging chest sinuses.

1. Unless there be obvious reason for doing otherwise, remove all drains, if such be present, and give the tissues an opportunity of healing. In our series this resulted in cure in two cases.

2. Explore the chest cavity, remove sequestra, improve drainage, and employ germicidal adjuvants, *e.g.*, hypochlorite solution according to Carrell's technique (Depage, Tuffier), B.I.P.P., flavine, and Beck's paste.

3. If a dense non-expansile membrane covers the lung, liberate the lung by removal of the confining membrane—decortication—pneumolysis.

4. If decortication does not result in sufficient expansion of the lung to fill the cavity it is necessary to collapse the chest wall by the removal of one or more, and the section of several ribs.

5. If for anatomic reasons it is impossible to collapse the chest wall and so obliterate the cavity large flaps may be turned from the abdomen or back and the cavity lined,—Beck's operation.

References:

1. Tuffier.—*Presse Med.*, Paris, 1918, 26, 497.
2. Taylor.—*Jour Am. Med. Assoc.*, 1916, 67, 1599.
3. Gurd.—*Lancet.*, May 25th, 1918, 721.
4. Gurd.—*Can. Med. Assoc. Jour.*, July, 1919.
5. Depage.—Quoted by Tuffier, *loc. cit.*
6. Graham.—*Surg. Gyn & Obst.*, 1920, 31, 60.
7. Tuffier.—*Ann. Surgery*, 1920, 32, 266.
8. Lilienthal.—*Ann. Surgery*, 1919, 30, 43.
9. Hedblom.—*Ann. Surgery*, 1920, 32, 288.
10. Beck.—*Surg. Gyn. & Obst.*, 1919, 27, p. 379.

INJURIES OF THE SPINE

GEORGE EWART WILSON, M.B., F.R.C.S., ENG., F.A.C.S.

Toronto

FRACTURES, in general, derive their chief importance from the fact that the broken bone is no longer able to support its accustomed weight. In fractures of the spine, however, the injury to the bone is quite secondary and the damage sustained by the contents of the vertebral canal is of paramount importance. Consequently, any discussion of spinal injuries must essentially be one dealing with the cord.

The vertebral column, as far as injuries in civil life are concerned, may be said to consist of the cervical, dorsal and lumbar vertebræ. Each vertebra consists of a body, pedicles and laminæ enclosing the vertebral canal and transverse articular and spinous processes. An intervertebral disk and numerous ligaments join the vertebræ together and it is upon these, rather than muscular attachments, that the spine depends for its strength. The articular processes deserve particular mention. In a general way the superior facets in the cervical region are directed upward, in the dorsal, backward, while in the lumbar region they look inward. From a surgical standpoint the column may be divided into a comparatively fixed portion which includes the upper ten dorsal vertebræ and a movable portion made up of the cervical, eleventh and twelve dorsal and lumbar areas. It will be noted that the more fixed segment is that to which the true ribs are attached, and these necessarily limit the movements of the thoracic area. There is a close connection too between the amount of movement and the size of the spinal canal which is wide and triangular in the neck and lumbar regions and narrow and rounded in the thoracic.

Within the spinal canal is the cord protected by a tough strong membrane the dura mater. This membrane in the greater part of its extent lies free in the canal being attached around the foramen magnum, second and third vertebræ above the and third sacral below. The cord itself ends at the lower border of the body of the first lumbar below which level is to be found the leash of nerves known as the canda equina. Since the cord is shorter than the vertebral canal it becomes necessary to know the relationship between the various cord segments and the surface. The spinous processes are readily palpated and are therefore taken as the guide. Roughly, if we add one to the number of the spine in the cervical region, two to the number of the spine in the upper dorsal and three to the number of the spine in the lower dorsal region it will give the number of the cord segment subjacent. For example, the tenth cord segment—that portion of the cord from which the tenth pair of nerves come off—is opposite the seventh dorsal spine. In other words, the farther we go down the longer do the intraspinal portions of the nerves become, until in its lowest part they run a course of seven to eight inches before leaving the canal.

For all practical purposes injuries of the spine may be divided into:

1. Those which damage the supporting structures and

2. Those in which there is an associated nerve lesion.

In Class 1 the injury varies from the simplest sprain in the nature of a torn ligament or loosening of a muscular attachment to a dislocation or even a fracture dislocation. A spinous or transverse process may be knocked off or a lamina may be pressed in. In the minor injuries rest in bed until the parts have a chance to heal will usually suffice; the more serious lesions will be considered in dealing with cases in Class 2.

There are two ways in which the spine is injured, direct and indirect force. Leaving out of consideration for the time being cases of gunshot wounds, the great majority are due to indirect violence. The most common result of direct injury is a fracture of a spinous process. A transverse process is occasionally broken in this manner and rarely a lamina is cracked or even driven into the canal. With indirect force the mechanism is nearly always the same, viz: a flexion of the spine from various causes. A man falls from a height and the upper part of the vertebral column is bent forcibly forward, or a

mass of earth falls upon the upper part of the back and the same flexion results. The first result of the acute flexion is a compression of the body of a vertebra which tends to crumple up. The ligaments about the articular processes and the interspinous ligaments, however, hold leaving a moderate kyphosis. If the crumpling process has been complete the body is changed into a pyramidal mass with the base directed towards the dura, and oftentime the bony debris project into the intervertebral canal. If the flexion force is more severe the body of the vertebra separates into upper and lower fragments and there is a slipping forward of the former which, in very bad cases, may come to lie anterior to the lower piece. At the same time there is more or less fracturing of the articular processes and ligaments, especially the interspinous, and a typical fracture dislocation is the result. In other instances there is very little crumpling of the vertebral body but instead a linear fracture which runs from behind downward and forward. As a general rule the dura is not torn and the cord, when pressed upon, is jammed between the postero-superior border of the lower body fragment and the laminæ above. Whether the cord is squeezed or not depends upon two factors, first the amount of displacement, and second upon the size of the vertebral canal, so that a fracture dislocation without cord involvement in the dorsal region is comparatively infrequent.

Dislocation of the vertebra can probably only occur in the cervical region for anatomical reasons, although there are supposedly authentic cases reported in the lumbar area. It is more frequently unilateral and is caused in the same way as the fracture-dislocation by forcible flexion. There is a tearing of the intervertebral disk and a rupture of the capsule of the articular processes. The inferior articular process of the displaced vertebra then come to lie in front of the superior articular process of the vertebra below. If the dislocation is bilateral the same thing occurs on the opposite side.

For anatomical reasons the spine is usually fractured in the lower cervical or the dorsi-lumbar regions. Each area is involved with equal frequency. In Burrell's report of two hundred and forty-four cases, forty-nine per cent. were of the dorsi-lumbar type. At the Toronto General Hospital since 1907 there have been admitted sixty-one patients with some spinal injury, the result of trauma other than gunshot wound. Of these fifty-six were males and five females. Of the females four died in the hospital while twenty of the males succumbed making the average hospital mortality about forty per cent. As to the regional frequency there were fourteen cervical, eight dorsal and thirty-seven dorsi lumbar, which includes the eleventh and twelfth thoracic and lumbar vertebræ. In two instances the records did not state where the fracture was. In percentages the dorsi-lumbar account for sixty-two, the cervical twenty-five, and the dorsal for thirteen, so that the cervical and dorsi lumbar areas, those in which movement is free, account for about ninety per cent. of all the cases. Comparing the mortality in the different regions we find that of the fourteen cervical cases, eight died; of the eight dorsal, seven died and of the thirty-five dorsi-lumbar ten died, giving percentage mortalities of fifty-six, eighty-seven and twenty-seven respectively. Analyzing these cases further we notice that of the fourteen cervical cases, three had no cord symptoms, in the dorsi-lumbar, eight had no involvement, while in the dorsal seven had paraplegia. If only those with cord damage are considered the mortality in the cervical region is seventy-three per cent. that in the dorsi-lumbar is thirty-six, while that in the dorsal is eighty-seven. These are set forth in the following table:

Region	Total No. Cases	Without Cord Involvement	With Cord Invol.	Mortality All Cases	Mortality With Cord Invol.
Cervical...	14	3	11	56%	73%
Dorsal 1-10	8	0	8	87%	87%
Dorsi-Lumber 11-12D. Lumbar..	37	8	29	27%	35%

It is impossible to accurately compare this table with that of Burrell who makes four subdivisions as to the region involved. In the cervical, however, it can be done. Thirty-three per cent. of his total were in this region and the mortality was eighty-five per cent. His mortality in all regions was seventy-one. Gurlt's mortality from two hundred and seventy collected cases is eighty, a figure exactly twice as large as in the series here reported. It is to be borne in mind, however, that forty per cent. means hospital mortality, a goodly number of those who were discharged doubtless having died subsequently.

The pathological changes in the cord vary from a complete severance with an inch or more separating the ends to one which to the naked

eye presents no abnormality whatever and it is not until a section is made that the destruction becomes evident. Frequently there is a slight transverse depression or dent posteriorly and evidence of congestion or softening. Later on, at operation or autopsy, the cord may show a distinct narrowing as if it had been tied with a string and adhesions may be present binding the cord to the dura. In every case of cord injury hæmorrhage plays a very important part. It may be beneath the dura giving rise to the condition known as hæmatorrhachis, or what is infinitely more important into the cord itself, producing a hæmatomyelia. In the former the effused blood has ample space and gravitates to the dependent part and in fact does very little harm. It is very different, however, with the latter for even minute extravasations damage the cord and at the same time exert more or less pressure upon adjacent areas with consequent loss of function. With larger hæmorrhages the destruction is very great, cavity formation in the cord being often a late result. Sometimes the cord has not been compressed at all by the fracture and yet paralysis occurs, due solely to focal hæmorrhages which usually involves the gray matter and preferably the anterior horn.

Gunshot fractures of the spine were very frequent during the great war—naturally, they showed many gradations. Unlike the injuries in civil practice they were frequently associated with wounds elsewhere so that many were immediately fatal. Besides the various fractures of the body or laminæ and processes with more or less pulping of the cord there were many instances where the missile merely traversed the structures adjacent to the spine and yet there was immediate paralysis, or a shell may simply have burst near the victim and yet the same phenomena develop. Such paralysis usually involves the legs and as a rule the sphincters escape. On section it has been found that there is widespread damage to the cord in the nature of hæmorrhage, œdema, softenings, and often an ascending cavity formation such changes occurring within a few hours of the accident.

The symptoms of a spinal lesion with cord involvement depend in general upon the amount of damage and the location. As a rule, immediately after the accident if the individual be conscious, and he usually is, he notices that all sensation has gone from below the seat of injury and that he is paralyzed. Occasionally one meets with an individual who, after having been knocked down, was able to get up and walk some distance and then suddenly fall completely paralyzed from the waist down. In such an instance the cord must have been contused by the fall and the hæmorrhage did not occur for some minutes. In another type there is immediate paralysis but it is only partial. For example, one leg becomes paralyzed and more or less anæsthetic, while the other escapes, but the bladder and rectum are commonly involved. In most instances, however, there is immediate complete paralysis and anæsthesia, with loss of bladder and rectal control. The paralysis is of the flaccid type and all forms of anæsthesia are present. Frequently, there is a band of hyperæsthesia, two to three inches wide, just above he anæsthetic area and due to irritation of the posterior roots. The reflexes vary tremendously but if the cord is completely divided they are all lost below the lesion, so that if any reflex remains one can safely say that some improvement is at least possible. Apart from this n positive deductions can safely be made from their study, so variable are their manifestations. Pain is of two varieties—local, when it is due to the injury in the neighbourhood and radiating caused by irritation of the nerves. The paralyzed bladder and rectum, especially the former, are always prominent symptoms and of very great importance. The bladder and rectum are controlled by a centre in the third and fourth sacral segments of the cord. From this autonomic fibres, the nervi erigents, proceed to the pelvic plexus of the sympathetic and from there are distributed to the detrusor muscle of the bladder and lower portion of the large bowel. This, pelvic nerve, as it is frequently called, contains apparently afferent as well as efferent fibres. Any lesions of the cord of sufficient degree above the third or fourth sacral will cut off all communication with the brain and result in retention of urine. When the pressure in the bladder is sufficient to force the sphincter the urine dribbles away and we have retention with overflow. On the other hand, if the cord is damaged at the third or fourth sacral segments or the reflex is broken by a damage to the pelvic nerve in its intra-spinal course there follows complete incontinence with relaxation of the spincter and the urine dribbles away as fast as it enters the bladder. Similarly with the rectum, a high lesion leaves the reflex governing the internal sphincter intact, but if the sacral centre, or the nerves below, are destroyed

the anal sphincter is relazed and patulous. As a rule then, there is retention of urine and constipation. A considerable number also suffer from abdominal distention. In part this may be due to the constipation but the chief factor is the disturbance to the sympathetic. Usually the skin area, which is paralyzed is dry, but in some instances sweating has been a marked feature. There is nothing characteristic about the pulse unless there is considerable shock. The temperature in cervical lesions is apt to be elevated a degree or two. Bed-sores are very common and appear very early. The usual sites are the sacral region and the heels. Priapism is often present, especially in lesions high up. It is never more, however, than a turgescence of the organ. If the intercostal nerves are involved there will be some respiratory distress and if the lesion is still higher and involves the diaphragm dyspnœa is very marked, coughing is impossible so that pulmonary complications are inevitable. A certain number have considerable vomiting, while, in a few instances, hæmaturia, which may be quite severe, is a troublesome occurrence. Kyphosis is an important sign. In the sixty-one cases it was present in twelve, or a little over twenty per cent., and it is noteworthy that in no instance does the history record a kyphus in the cervical region. In dislocations or fracture dislocations of the cervical region the position of the head its characteristic. If unilateral the head is turned to the opposite side but approximates the shoulder of the same side. If the displacement is symmetrical the chin is approximated to the sternum. In either case the patient, if walking, tends to support the chin and has difficulty in extending the neck. Cervical lesions are very apt to destroy the pupillary sympathetic fibres in which case there will be a small pupil which wont dilate with cocaine, flushing and loss of sweating narrowing of the palpebral fissure and enophthalmos. A transverse lesion involving the cord at or above the fourth segment is usually immediately fatal owing to paralysis of the diaphragm. In a small percentage of cases there is an associated cerebral lesion which renders the patient unconscious. As a rule this lasts at most a few hours, although in one instance in this series it persisted for nine days.

In determining the site of the lesion in the cord there are three ways by which this may be approximately ascertained. First, by noting the exact position of the deformity when present or the point of maximum tenderness. Second, by a careful study of the sensory changes, and lastly, by the paralysis. In arriving at a conclusion from the bony lesion it must be borne in mind that the cord segments do not coincide with the ljps of the corresponding spinous processes, the former being located at a higher level as pointed out earlier, so that in the cervical region we must add one to the number of the spine, in the upper dorsal two and in the lower dorsal three to obtain the number of the subjacent cord segment. The lumbar enlargement from which the lumbar and sacral plexuses are derived lies opposite the spines of the tenth, eleventh and twelfth thoracic. There is a further source of error in that segments of the cord situated above those opposite the fracture may have been more or less destroyed by hæmorrhage into its substance and cases occur in which the bone is injured in the lumbar region and the paralysis and sensory loss correspond with a transverse lesion of the cervical enlargement. In such an instance the only possible explanation is that hæmorrhage has occurred into the cord above and probably due to acute flexion of the neck at the time of the fracture lower down. Hæmatomyelia with the characteristic areas of dissociated anæsthesia is sometimes produced in this way. There is another possibility of error more particularly in the lower part of the cord and this observation applies equally to tumours. If the injury be sufficiently violent to sever the cord it will at the same time crush the long anterior and posterior roots as they proceed downwards to leave the canal by the intervertebral foramina. Consequently, the clinical picture will be that of a complete lesion at the level of that segment from which the highest series of destroyed nerves came. In the cervical region additional information may be obtained by an examination of the pharynx as it is possible to palpate the upper four cervical bodies.

Sensory changes give us the most reliable means of localizing the seat of trouble in the cord. It has been shown by Sherrington that each area of skin is supplied by three cord segme ts so that if it is desired to anæsthetize a given area two posterior roots must be divided. It follows, therefore, that the upper border of anæsthesia points to a lesion of the next higher or perhaps the second higher segment than that represented by the level of the anæsthesia. It also follows that the anæsthesia in the upper limit is never so profound as that lower down since there is always an area receiving a partial supply from

the undamaged segment above the lesion. Frequently, there is a band of hyperæsthesia of variable width above the anæsthesia. This may be due to irritation of the posterior roots or possibly to an irritative condition of the cord immediately above the lesion, whereby ordinary sensations are felt in an exaggerated degree. Sometimes the level of the anæsthesia is higher than one would expect from the paralysis and at the same time the symptoms suggest a complete transverse lesion. In such a case it probably means that the posterior roots have been crushed as well and therefore a very severe lesion.

It is not my intention to tabulate the sensory areas of the different cord segments as every text book on neurology has such a chart. In comparing these, however, one observes that no two are alike. As a matter of fact this is what one would expect seeing that in most cases the conclusions were drawn from clinical observation and consequently the exact limits of the lesion were not accurately obtained. The different cord segments are not demarcated one from another, so that a difference in the anæsthetic field must result if the lesion ended at the lower as compared with the upper limit of the segment. Then in certain areas the cord segments are very short, as in the lumbar enlargement and here it is difficult even to determine the limits of the segments so that it is not to be wondered at that the greatest variation as to sensory distribution is found in the parts supplied by the lumbar and sacral plexus. Possibly, too, all individuals have not the same sensory supply. In any case it is well to remember that the lesion is higher than we expect.

Paralysis is always a prominent symptom. It is always of the flaccid type and in complete transverse lesions remains so. Here, too, charts have been prepared indicating the segmental origin of the various muscles and here again there is considerable differences of opinion. But each cord segment contains motor nuclei for several muscles and at the same time every muscle is supplied from at least two segments which are not necessarily contiguous; consequently, it is not difficult to see why there should be considerable variation in the published tables.

While it is undesirable to detail the clinical picture of lesions in each segment, there are certain common types that may, with profit, be mentioned. Of the cervical injuries the vast majority involve the fifth and sixth vertebræ, giving rise to two types of anæsthesia, depending upon whether the upper or lower part of the cervical enlargement is involved. In the former the anæsthesia extends from the second rib down, including the arms. Breathing is entirely diaphragmatic and the shoulders can be shrugged. In the latter the anæsthesia starts at the nipple line, but is incomplete in the arms which are usually sensitive on the outer side. The shoulder muscles and flexors of the forearm escape which allow the hands, which are paralytic, to be placed on the chest, a characteristic attitude assumed by these patients.

In the dorsal fixed area there is nothing of special interest except that it is here that one usually meets with the Brown Seguard type of paralysis. This unilateral lesion results in paralysis with rigidity and increase in the tendon reflexes and often hyperæsthesia on the side of the traumatism with loss of touch, pain, heat and cold on the opposite side below the damaged segment.

In the lower part of the spine the majority of the fractures, over sixty per cent. in this series, involve the twelfth dorsal and first lumbar vertebræ, so that the lumbar enlargement is commonly the seat of the lesion. Here one meets with two types depending upon whether the upper or lower part of the swelling is the seat of the trouble. In the former the paralysis includes the lower abdominal wall and the parts below while the anæsthesia starts at Poupart's ligament. In the latter the paralysis is from the knee down, while the anæsthesia takes in the foot and leg proper with a band running up the back of the thigh and including a saddle-shaped area about the buttock.

Lastly, there is the type of paralysis caused by an injury to the canda equina. Any bony injury below the first lumbar body may damage the leash of nerves streaming down from the lower end of the cord. Obviously, it is difficult to distinguish such an injury from one of the cord since they all have their origin from the lumbar enlargement. When the canda is injured it is the most central nerves which suffer and these are the sacral branches and the paralysis affects the feet and peronei while the anæsthesia is limited to a saddle-shaped area on the buttock and about the anus and on the back of the scrotum. As in all the other types there is involvement of the bladder and rectum.

In differentiation from a low cord lesion, pain is of value and, if severe, is in favour of canda trouble. In a cord lesion the symptoms are more apt to be symmetrical and bed sores are more likely to develop. With such a picture, if the

x-ray shows a fracture below the level of the cord, a lesion of the canda equina is in all probability present.

The prognosis in spinal cord injury is bad.* It is usually stated that the higher the injury the worse the outlook. Certainly this is true for the upper four segments of the cord, but leaving these aside the mortality in this series was highest in the dorsal region. Three patients died on the day of admission—ten died within the first week, while seventeen died within the first three weeks. In other words, seventy per cent. died within the first three weeks. On the other hand, there are instances where the patient with paraplegia from injury has lived as long as eighteen years. In one institution in Toronto there are at present twenty-six cases of cord injury, the result of the War, varying from four years' duration or more. Last year there were five deaths. It is apparent, therefore, that if the patient survive the first three weeks the possibility of living for a considerable time is good.

In discussing the treatment of spinal injuries, very little need be said about those instances in which the cord has escaped as ordinary surgical methods apply. Fracture of a spinous or transverse process requires rest sufficiently long to ensure complete repair and then followed by exercises devised to cause movements of the damaged area. In the more severe type, where the centrum has been partially compressed, but where the cord has escaped the recumbent posture on a mattress beneath which a fracture board has been placed is indicated. Later the patient may be allowed up, wearing a plaster jacket or other supportive brace. In this connection one might point out the advisability of having every severely injured back *x*-rayed, as it is not an unusual experience to find that what was being treated as a sprain was in reality a severe bony injury.

When there is an associated paralysis the problem is an entirely different one. If it be first aid that is being administered to an individual with a broken back the greatest care must be taken in moving him lest a cord, not yet damaged, be injured or, in the latter event, to obviate further destruction. Under no circumstances should any attempt be made to elicit crepitus except possibly in a local spinous process fracture where no harm could result. If there is, in addition, unconsciousness, still more care must be exercised since muscle protection is to a great extent gone. Since an *x*-ray is essential, there will be less disturbance to the patient if this be taken before putting him to bed. If possible a water or air mattress should be provided to avoid, as far as possible, the development of pressure sores. Good nursing is here of the first importance and the utmost care should be taken to keep the sheets dry and free from wrinkles or bread crumbs. Should they develop they are treated upon general lines and, though very slow, large areas will usually heal over in the course of six or eight months.

With the patient in bed, the next consideration is the condition of the bladder and rectum. In the great majority of instances there is constipation and enemata must be administered. The bladder will, in all probability, be found distended. There are three methods of dealing with this condition. In the first the bladder is allowed to distend and overflow into a receptacle, pressure being applied above the pubes from time to time, or various areas stimulated to aid in the expulsion if necessary. In the second the catheter is used at regular intervals and the urine withdrawn under the most rigid asepsis. In the third a supra-pubic cystotomy is done and a tube inserted. A Sprengel pump is subsequently attached and the patient kept dry. The advocates of the first method claim that there is less danger of cystitis if the catheter is avoided, but I have had but little personal experience with the method. The second plan is that usually adopted, but it may be taken for granted that no matter how carefully the catheterization is done, it is only a matter of time before there is urinary infection. But the severity of the bladder infection is very variable, some having a great deal, others little, and it depends largely upon the natural resistance of the patient. If life is prolonged sufficiently the bladder reflex very often comes back, provided, of course, the reflex arc is not destroyed, and the infantile condition obtains whereby at certain more or less regular intervals the bladder empties itself, but without the knowledge of the patient. It is unusual for this to occur under six months. The third method has few advocates as a primary procedure, but may have to be adopted later in those instances where there is increasing difficulty in passing the catheter or where the cystitis becomes so severe that the sloughing masses cannot be removed through the catheter. The bladder tends to contract, but it is surprising to find how much urine some of the bladders with suprapubic drainage even will hold and that after a period of three years.

*Rapid wasting and loss of tone in the muscles are indicative of a severe lesion.

Infection in the kidneys supervenes soon after the bladder is involved and this again is not the serious complication that we have been led to imagine. From time to time the patient will have a chill or a feeling of chilliness, some rise in temperature and pulse, with loss of appetite and frequently vomiting and in a few days he is himself again. He will never, of course, recover, but he may live in comparative comfort for years with a chronically infected bladder and kidneys, especially if he avoids the formation of calculi which are liable to form. There died in Toronto during the influenza epidemic a man who had been paraplegic for eighteen years and whose urine was never free from pus during that time.

The treatment of the local condition is one on which, from the perusal of text books, there is still a considerable difference of opinion. Roberts and Kelly, for example, give a list of fifteen indications for and against operative treatment, nine being for and six against interference. Most other writers are more conservative. The reason for such widely different views is, I believe, the failure to properly appreciate the pathology of the nervous lesion and secondly, the reported instances where operation has apparently cured cases where the cord was completely severed. There are three ways in which the cord may be injured in a fracture dislocation. It may be stretched or crushed between two hard substances or hæmorrhage with a following traumatic œdema may occur into its substance, or what is most common crushing and hæmorrhage are combined. That part of the cord which is pulped is destroyed forever and no regeneration whatever will take place. But while most lesions are transverse, the majority are incomplete and the improvement which follows is due to the gradual absorption of the exudate which occurred into that part of the cord which escaped destruction. A common indication for operation in text books is incomplete destruction and yet to operate early as soon as the shock has passed, but in any considerable damage to the cord there is sure to be complete paralysis for several days and it will be impossible from the clinical picture during the first fortnight to say how badly the cord has suffered. It may be taken for granted, too, that in a fracture dislocation where there has been any considerable displacement the position of the fragments when the examination is made is different from that at the time the crushing took place, for a certain amount of recoil is inevitable and it may even be complete. In other words, the damage was done at the time and bony pressure on the cord is so rare, as to be negligible. Bowlby's series of twenty-one autopsies showed no instance of pressure by bony spicules or narrowing of the canal. It follows, therefore, that operation to relieve pressure upon the cord is not indicated and in the majority of cases adds more trauma to the already damaged cord. True, there are cases of complete severance of the cord cured by operation reported in the literature. Stewart and Harte, in 1902, reported the case of a man whose cord was severed by a bullet and a three-quarter inch gap closed by suture, so that in sixteen months he was able to walk fairly well and had control of his urine, and there are others of a similar nature. But on scrutinizing these reports we find that they behave like so many unoperated cases that we are forced to the conclusion that an error in observation has been committed, supported as we are by the undoubted fact that the cord in man, at least, will not regenerate. The literature, too, contains many reports of improvement following interference upon cases where various operations were performed, such as the removal of a small blood clot from the dura or the excision of a depressed lamina or the removal of a subdural hæmorrhage, but a critical examination of these reports fails to convince one that any good whatsoever resulted from the operation and that any improvement which followed was due to the natural absorption of exudative products. Extra or intra dural hæmorrhage in themselves never call for operation and in themselves produce only transient symptoms. If there is paralysis, one may safely say an intramedullary lesion exists in addition. In short, there is only one positive indication for operating upon a spinal cord injury and that is where the damage has been to the nerve roots making up the canda equina. If a stereoscopic *x*-ray shows spicules penetrating the cord it is justifiable to remove them, but too much must not be expected from the operation. In military surgery there were only two generally recognized indications for operation, first the presence of a foreign body lying within the canal, and second, where the man suffered very severe pain indicative of a root lesion. In a canda injury, however, one is below the cord and is dealing with structures which are known will regenerate and therefore come into the class of peripheral nerve surgery. As there are no sure means apart from actually seeing the nerve by which in the early stages we can be certain that it is completely divided so in lesions of the canda, so that time

must be given for incompletely divided roots to recover. If then, there is evidence of complete root division operation should be undertaken. Tuffier, during the great War, successfully performed this operation and, so far as I am aware, it is the only case on record where it has been accomplished in man. Naturally, the operation is a difficult one since the anterior surface of the intervertebral canal is about three and a half inches from the dorsal surface of the body and, at best, the opening into the canal cannot be made more than three quarters of an inch wide. But it offers the only possible hope of recovery and there is very little danger if properly performed of doing further damage.

In this series there were fifteen operations, none of which were upon the canda, with two deaths. One followed the close of a laminectomy and the other manipulation of the cervical vertebræ under an anæsthetic to determine the existence of a fracture. The immediate mortality was consequently very low, namely, thirteen per cent., as compared with a forty per cent. mortality in sixty-four cases reported by Hahn, and a thirty-nine per cent. in Chipault's one hundred and sixty-seven cases. In each series are cases recorded as cured or improved, but I am convinced that the natural tendency to a certain degree of recovery will explain them all.

Lastly, there are the cases of dislocation or fracture dislocation in the cervical region. Again the text books contain descriptions of the various methods to overcome the deformity. In my opinion they are all dangerous and have done more harm than good. If there is paralysis reduction will not render this less, and if there is none the patient should not be subjected to manipulation which is liable under the best of conditions to render him a cripple for the rest of his life. If paralysis is present the case is treated in the ordinary way, but if the cord has escaped, the neck is placed in plaster of paris and immobilized for at least two months. Often there is a great deal of radiating pains for weeks, but these tend to disappear as the months go by.

We have much pleasure in calling the attention of our readers, who are interested in all the various phases of the important department of public health and preventive medicine, to the change of scope in the well-known journal, *Modern Medicine*, which also changes its title to that of *The Nation's Health*. From a publication devoted to clinical medicine, it becomes a health magazine of broad national service. A magazine which hopes to be the organ of the American Association of Industrial Physicians and Surgeons, and one in which the many problems of industrial medicine will receive scientific attention. Community health including organized health activities, public health nursing and sanitation in its broad aspects, will be kept under consideration with emphasis upon the practical methods for the prevention of disease and the promotion of general health and physical efficiency as worked out by experience throughout the country. Problems of infant welfare and child health, particularly the health of school children, will be specially emphasized.

Institutional health, including physical care, health service, and medical attention in institutions, boarding schools, and colleges, will be given the attention which the importance of health problems in such institutions deserves.

DENTAL INFECTION AND INTERNAL MEDICINE

SIDNEY J. S. PEIRCE, M.D.

Brandon

IT is generally accepted by both dentists and medical men, and is gradually being realized by the laity, that dental infection is associated with many symptoms other than toothache. Indeed at the present time the dental abscess is being accredited with a great variety of conditions from alopecia to bunions. There is danger of drawing loose conclusions from isolated cases. A valid estimate can be made only from a fair sized number of unselected cases in which the teeth have been investigated by radiophotographic methods, the symptoms recorded impartially and the general physical make up of the patient subjected to a thorough revision.

For the purpose of the present study, one hundred consecutive cases have been selected in which complete dental films were available. The *x*-ray findings were recorded and the symptoms complained of tabulated under the following general headings: Respiratory, Circulatory, Gastro-intestinal, Genito-urinary, Nervous, Skeletal and Cutaneous. The presence of other foci, in tonsils, nasal sinuses, appendix or gall-bladder and evidence of tuberculosis or syphilis were also recorded.

The *x*-ray findings were seen to divide the cases into three main groups (a) apical abscesses, (b) general alveolar absorption, (c) negative cases. The remainder, forming a heterogeneous group, showing a variety of findings such as unextracted roots, unerupted teeth, necrotic centres, etc., were discarded for the purpose of this study.

The number in each group were as follows: (a) Apical abscesses, forty cases; (b) General alveolar absorption, twenty-five cases; (c) Negative, twenty-two cases.

The percentage of cases of each group which present symptoms referable to the various systems indicated are shown in the following table:

	A	*B*	*C*
Nervous	57%	52%	27%
Skeletal	45	32	18
Cutaneous	17	24	9
Gastro-intestinal	42	32	54
Respiratory	12	0	5
Genito-urinary	17	4	22
Circulatory	5	4	27

In groups A and B, there is a great preponderance of symptoms referable to the nervous and skeletal systems. Of the former class chronic neuralgias often of the trunk or extremities are characteristic and in the latter class the chronic backache traceable to spondylitis of the lower dorsal or lumbar vertebrae is a frequent finding. Skin symptoms, in particular chronic eczemas in the region of the face, show a well marked preponderance in the groups showing positive dental findings. There is apparent, in the present analysis, no relation between dental infection and gastro-intestinal symptoms, but an inspection of the case-histories in the positive dental cases leaves one with the impression that there is commonly in these cases an irritable condition of the gastro-intestinal tract comparable to the irritable conditions of the skin seen in other cases, as not infrequently one finds gastro-intestinal symptoms complained of which find no explanation in the subsequent *x*-ray examination of the gastro-intestinal tract. Respiratory symptoms are more than twice as frequent in the dental abscess cases than in the negative cases. The difference is made up by the presence of cases of asthma in the first group.

The result of tabulation of associated foci of infection is shown in the following table:

	A	*B*	*C*
Infected Tonsils	15%	20%	14%
Infected Sinuses (antra)	25	20	14
Infected Gall-bladder	10	0	9
Appendicitis	5	4	4
Tuberculous infection	10	8	9
Positive Wassermann	2 (doubtful)		

Résumé of address before Western Manitoba Dental Society, February 21st, 1921.

The only striking finding here is the not infrequent association of infected antra with dental infection.

Conclusion

Dental infection is associated with a train of symptoms related in particular to the nervous and skeletal systems; especially to various forms of neuralgia, periarthritis and spondylitis. In a less but still in a fairly obvious degree it is associated with symptoms related to the skin and the gastro-intestinal and respiratory tracts and would appear to be responsible for certain forms of eczema and other irritable skin conditions, for many obscure gastro-intestinal disorders and for certain cases of asthma.

The two conditions described by the radiologist as apical absorption (or abscess) and general alveolar absorption appear in the main to be associated with the same train of symptoms.

There is nothing in the present study to indicate that dental infection has any relation to malnutrition, nor does there appear to be any ætiological relation between dental infection and the graver forms of gastro-intestinal infection such as appendicitis and gall-bladder infection. Tuberculosis and syphilis do not enter into the problem.

Dental infection and infection in the accessory sinuses of the nose, particularly the antra are frequently associated and as the train of symptoms related to infection in these two sites is frequently identical it is unwise in investigating the one to overlook the other.

THE NATURE OF ACIDOSIS IN NEPHRITIS

Edward H. Mason, M.D.

During the past few years a more thorough understanding of the importance and frequency of acidosis in nephritis has been brought before the medical profession. We know to-day that in severe acute and chronic nephritis, acidosis is frequently extreme, warranting special therapeutic measures, and that not infrequently patients die in so-called "uremia", the immediate cause of death being acidosis.

The nature of this acidosis was first suggested by Marriott and Howland[1] as being due to an inability on the part of the kidneys to eliminate acid phosphate, resulting in an accumulation of the inorganic phosphates in the blood and tissue lymph. To neutralize this excessive retention of acid phosphate the bicarbonate reserve of the body is drawn upon, resulting in a lowered carbon dioxide tension in the blood. Such an acidosis, so frequently encountered in nephritis, is distinctly a "retention" acidosis, as distinguished from the acidosis, or more properly termed ketosis, found in diabetes mellitus, starvation and vomiting of pregnancy. The latter is a productive ketosis due to the inability of the body to completely oxidize the fat molecule, resulting in an accumulation of the three acetone bodies in the blood. In nephritis we frequently have marked dyspnœa due to the inability on the part of the body to maintain the normal ratio, $\frac{H_2CO_3}{BHCO_3} = \frac{1}{20}$, resulting in the blood containing more ionized hydrogen than normally. Such a condition is a decompensated acidosis. The degree of the phosphoric acid retention can be readily determined by the CO_2 tension in the blood, which we know decreases in proportion to the exhaustion of the alkaline reserve. Chace and Myers[2] have recently presented a small series of cases of chronic nephritis where the CO_2 volumes per cent. content of the blood fell to such low levels that the immediate cause of death was apparently due to acidosis.

The treatment of phosphoric acid retention in nephritis depends upon a passive restoration of the bicarbonate reserve by the administration of sodium bicarbonate by mouth, rectum, or by other channels, combined with the usual means of re-establishing kidney function. In most cases it is not difficult to raise the CO_2 capacity of the blood to a normal level, but it is more difficult to stimulate the kidneys to eliminate the retained phosphates. Frequently the therapeutic proce-

From the Metabolism Clinic of the Royal Victoria Hospital, Montreal.

dure is of a temporary nature, as the lesion of a chronic nephritis showing acidosis usually has progressed to a contracted kidney, with loss of the ability to excrete the acid (NaH_2PO_2) from the alkaline phosphate (Na_2HPO_2). All alkali therapy should be properly controlled as it is not without danger. This applies especially when there is impaired kidney elimination. The danger is alkalosis associated with symptoms of tetany, and such findings have been reported by Harrop[3] with a plasma CO_2 of only 80 vols. per cent.

As a good example of the importance of phosphoric acid retention in chronic nephritis the following case is reported:

Case No. 156 (Metabolism). Admitted to the Royal Victoria Hospital February 14th, 1921, died March 1st, 1921, male, age twenty-six, student. The complaints on admission were headache, shortness of breath, vomiting, and general malaise. The patient had been in usual health until February 1st, 1921, when he had a severe attack of diffuse pharyngitis, associated with headache and fever; also marked prostration, palpitation and repeated nose bleeds. His family history was negative. In 1912 patient had an attack of acute nephritis following exposure. At this time he was in bed for four months. Since then he has had a persistent trace of albumen in his urine. Tonsillectomy was done in 1920. On admission the patient appeared severely ill, with face flushed, respirations rapid and laboured. The mouth was dry. There was tremour of the hands, and the mucous membranes were pale; no œdema; pulse 105; increased tendon reflexes. No pathological reflexes were present. The urine, obtained by catheter due to inability to void, was amber in colour, acid in reaction; sp. gr. 1013, albumen + +, sugar negative. Microscopic examination revealed a few white blood cells and epithelial cells, but no casts or red blood cells. Examination of the blood showed R.B.C. 3,200,000, hæmoglobin 85 per cent. (Palmer method). Blood pressure was systolic 96, diastolic 36. Examination of the eyes gave negative findings; examination of the stools also negative results. Chemical examination of the blood gave the following results: Blood urea, 3·72 grams per litre; creatinine, 10·8 mgm. per 100 c.c.; uric acid 13·8 mgm. per 100 c.c.; inorganic phosphates (as P.), 11·1 mgm. per 100 c.c.; blood plasma CO_2, 26·2 vols. per cent.

Treatment was instituted along the lines of stimulating the kidney function by forcing fluids and by glucose given intravenously to the point of a slight glycosuria. An attempt was also made to neutralize the existing acidosis with sodium bicarbonate.

The further course of the case is best shown in Tables I and II, which follow on next page.

From the above history and findings one would conclude that the condition was one of chronic parenchymatous nephritis with the kidneys markedly contracted (secondary contracted kidney.) Upon admission there was marked retention of non-protein nitrogen in the blood, as well as a retention of inorganic phosphates. The latter had resulted in a lowering of the plasma CO_2 to 26·2 vols. per cent. This acidosis was relieved by sodium bicarbonate, the plasma CO_2 rising to 47·7 vols. per cent. With this all respiratory symptoms disappeared. The volume output of urine was likewise increased up to a maximum of 2790 c.c. with a urea output of 22·1 grams per day. However, the specific gravity remained rather fixed. As seen from Table 1, a marked anæmia developed which was improved by repeated transfusions of whole blood. With the neutralization of the acidosis little improvement in the retained phosphates was noted. The blood urea, despite all procedures, tended to rise steadily to the level of 6·18 grams per litre at death.

A few days previous to death the patient developed a cystitis, the white count rising to 31,800 on February 28th, 1921. Likewise there was a terminal bilateral parotitis.

Autopsy Report. Record No. 3828.

Anatomical Diagnosis: (1) Degenerative and productive nephritis (secondary contracted kidney); (2) Congenital aplasia of right kidney; (3) Acute exudative hæmorrhagic pericarditis; (4) Cystitis; (5) Parotitis.

Kidneys. Left. Weight, 50 grams. The capsule strips easily leaving a finely granular yellowish surface. On section there is marked atrophy of the renal parenchyma with increase of the peripelvic fat. Differentiation between cortex and medulla is lost and the kidney surface appears of a mottled yellowish pinkish colour.

Histology: The tubules are swollen and granular, desquamated in places leaving simply their outline with no epithelial lining. There is an increase in the amount of fibrous tissue and an infiltration with small lymphocytes. The blood vessels show thickened walls with medial hyaline changes and local spots of endarteritis. The glomeruli show beautifully a series of changes, beginning with slight productive ones with small round cell infiltration, progressing to contraction

TABLE I.

Date 1921	Intake		Output (urine)				R.B.C. per cmm.	Remarks
	Glucose intravenously grms.	Total $NaHCO_3$ grms.	Volume c.c.	Sp. Gr.	Glucose grms.	Urea. grms.		
Feb. 14	60	14	670+	1013	0	—	—	
" 15	60	43	280	1014	1.3	—	3,200,000	
" 16	30	46	730	1015	2.3	—	—	
" 17	97·5	18·5	1650	1013	4.6	10.1	1,010,000	Transfusion 400 c.c. blood
" 18	—	—	2060	1012	0	18.6	—	Transfusion 500 c.c. blood
" 19	—	—	1790	1014	0	22.1	—	
" 20	—	—	1720	1014	0	14.6	2,500,000	Transfusion 300 c.c. blood
" 21	—	—	1060	1012	0	8.9	3,040,000	
" 22	—	—	1150	1013	0	—	2,850,000	
" 23	45	27	1100	1017	1.9	8.0	—	
" 24	90	20	1420	1017	4.4	8.8	—	
" 25	90	8	920	1017	3.1	7.2	2,080,000	
" 26	—	—	1850	1015	2.1	16.5	—	Transfusion 840 c.c. blood
" 27	90	—	1180	1016	6.2	10.4	—	
" 28	90	4	150	1017	6.0	—	2,070,000	
March 1	Died							

TABLE II.

Date 1921	Blood					
	Urea. mgm. per litre.	Creatinine mgm. per 100 c.c.	Uric Acid mgm. per 100 c.c.	Plasma Chlorides grms. per litre	Inorganic Phosphates (as P.) mgm per 100 c.c.	Plasma CO_2 Vol. per cent.
Feb. 14	3·72	10·8	13·8	—	11·1	26·2
" 15	3·63	—	—	—	—	29·0
" 16	4·77	—	—	—	—	31·9
" 17	4·77	12·0	19·2	5·2	7·3	35·2
" 18	—	—	—	—	—	47·7
" 21	4·77	18·4	18·2	—	8·0	40·0
" 23	5·32	—	—	—	—	36·1
" 24	—	—	—	5·6	—	46·8
" 25	5·31	—	—	—	—	55·5
" 28	6·18	15·0	17·6	—	6·97	35·7
March 1	Died					

and thickening of Bowman's capsule, and finally to hyaline replacement of irregular areas of glomerular tissue to complete hyaline fusion.

Right: Weight, 10 grams. This kidney is very small, showing only a little parenchyma at the lower pole. The rest is represented by fibrous tissue. The pelvis is dilated to the size of a small plum and the ureter is slightly dilated.

Summary

The case reported shows the findings so frequently encountered in the advanced stages of secondary contracted kidney. As shown at autopsy the therapeutic procedures simply prolonged life. The case demonstrates quite well the severity of the acidosis present, associated with the retention of inorganic phosphates in the blood. Despite all therapeutic procedures the blood urea rose steadily till death. It was the most constant finding, and apparently of the greatest prognostic importance.

References:

1. Marriott, W. McK. and Howland, J.—*Arch. Int. Med.*, 18, 708, Nov., 1916.

2. Chace, A. F. and Myers, V. C.—*J.A.M.A.*, 74, 641, March 6th, 1920.

3. Harrop, G. A.—*Bull. Johns Hopkins Hosp.*, 30, 62, March, 1919.

FRAGILITAS OSSIUM

H. P. Wright, M.D.

Montreal

OSTEOGENESIS imperfecta is a rare system disease of unknown origin characterized by imperfect development of bone. Clinically, it is manifested by multiple spontaneous fractures and it occurs in two forms osteogenesis impe - fecta congenita, and osteogenesis imperfecta tarda. The name was coined by Vrolik in 1845 and since that time various other names have been suggested from amongst which, one stands out pre-eminently viz: Fragilitas Ossium. These two terms are practically synonymous and are both equally useful in that they suggest nothing but a clinical picture and do not pre-suppose any knowledge of the underlying cause. For the sake of increased clarity, osteogenesis imperfecta might be applied to those cases which occur in utero, or in early infancy, and the term fragilitas ossium confined to cases occurring after the second and third year of life. On this account, the cases here reported have been called fragilitas ossium.

The direct cause of the disease is not known. Griffith estimated an hereditary factor in 27 per cent. Neither sex seems especially prone to the disorder. The greater number of cases reported occur in very early life, and the earlier the condition appears, the more unfavourable the prognosis. Cases occurring after three or four years frequently go on to spontaneous cure. The condition does not appear characteristic of any particular race. It has been reported in coloured people as well as in white.

In bulletin number fourteen of the Eugenic Record Office, the following statements are made: "That the cause of the imperfect osteogenic processes is not the condition of the mother is proved by the fact adduced by Schwarz and Bass (1912, page 317) that, in one instance, one of twins showed osteopsathyrosis at birth and the other did not. That the cause is not due to the poor condition in later life is indicated by the circumstance that a bone fracture frequently occurs even in intra-uterine life, or while being born. Still another reason for denying to external conditions the sole cause of the irregular development is that the distribution of cases is not haphazard but generally runs in families."

The primary pathological conditions are of the same nature in all the bones of the body, which are either soft or brittle. There is a marked preponderance of medullary substance over spongiosa, and the lamellar process of the bone is less marked. The bone marrow is mostly fibrous, osteoblasts are markedly diminished in number. As a consequence of this abnormal state of the bony tissues multiple fractures occur on very slight provocation. Children suffering with this condition are usually mentally under-developed. Their skin is soft and delicate. The reason of this under-development and softness of skin has been explained as due to the restricted life resulting from fractures. A peculiar condition sometimes associated with fragilitas ossium is that of oto-sclerosis and blue sclerotics. The Currie family is the most noted example of this syndrome, the condition having been present irregularly through four generations.

Reference has already been made to the age at which fractures occur. The number of fractures that may occur is enormous, Chaussier having reported a case with one hundred and thirteen fractures. There is little pain associated with fractures. Healing is rapid.

In several of the reported cases the metabolism has been worked out. Calcium has been found to be slightly low; although retention of calcium was good. Cases of tetany with less calcium have no fractures. The non-protein nitrogen, fat, carbohydrate, etc., have been found to be normal.

Inasmuch as the disease is a constitutional one, all the bones of the body show changes in the skiagram. There is a deficient shadow formation due to increased permeability to x-rays. The cortex is of irregular thickness, but is on the whole very thin and parchment-like in appearance. The spongiosa contains wide meshes and an absence of structural markings. The medullary cavity is increased in size and shows irregularly mottled shadows. Some writers emphasize the amount of callus found at the seat of the fracture.

The condition must be distinguished from rickets and syphilis, and this is easily accomplished by the Wassermann test and *x*-rays.

Any surgical method of treating fractures may be employed. Frequently the fractures unite easily. However, often the next fracture occurs in a short time and the surgeon soon tires of treating fractures which recur with such rapidity. Certain cases go on to spontaneous cure, and the older the child is when the first fracture occurs, the more hopeful is the prognosis. Thyroid, parathyroid, pituitary, thymus, pineal gland and adrenal have been tried separately and in combination without noticeable success. Fresh air, good food and codliver oil is indicated in all cases. Phosphorus may be combined with the codliver oil. Calcium has also been freely administered with a view to increasing the amount of calcium in the blood, but its effect appears to be purely temporary.

The cases here reported are of interest because of the inbreeding of the parents. No new strain has been introduced in three generations.

Report of Cases

The first case referred to was in the Montreal General Hospital under the charge of Dr. A. Mackenzie Forbes and Dr. F. G. Finley. Later the two cases were in the Children's Memorial Hospital in the service of Dr. Forbes, and as a result of his suggestion are reported:

L. M.—Aged ten years.

Complaints—frequent fractures.

P. H.—Eldest child. Normal delivery. No forceps. Breast fed till twelve months. First tooth at age of eleven months. While still being breast fed he developed pneumonia. From this time till he was two and a half years old had "convulsions" which occurred approximately every two weeks.

Mother said she had no trouble weaning him.

Commenced to walk at twenty-four months. Bow legged and used to sweat a good deal at night. Stomach was big. At age of twenty-six months slipped on a mat and broke his right thigh. This was put up in plaster paris for six weeks. Three months later he fractured the left thigh and this extremity was in plaster paris for two months. Each femur is said to have been fractured ten times in the last eight years. The fractures always occurred alternately in each leg except the last time when he fell out of a toy automobile and so fractured the same thigh twice in succession. At the age of five, while crawling on the floor he fractured the left humerus. He has had measles, whooping cough and diphtheria. Tonsils were removed two years ago.

F. H. There is nothing of interest in the family history except the extraordinary form of intermarriage which resulted in the birth of the patient. The mother of the patient at the age of twenty-two years married her uncle (her mother's brother) he was then twenty-three years of age. Patient's grandmother has four other brothers beside the one his mother married. All those four brothers are married and have healthy children. None of them married relations. The mother of the patient has two sisters and they married outside the family and they have healthy children (no fractures.) The patient's maternal grandmother also married her maternal uncle. The patient is the eldest child and was born one year after marriage of parents. He has a brother with the same complaint and a sister between himself and this brother and she has never had any fractures and has always been well.

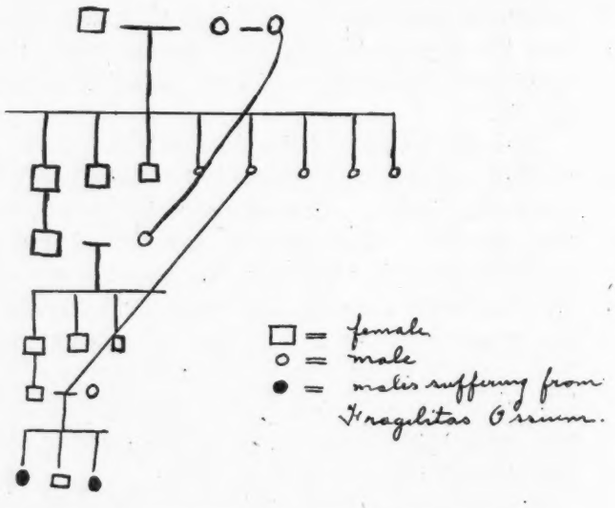
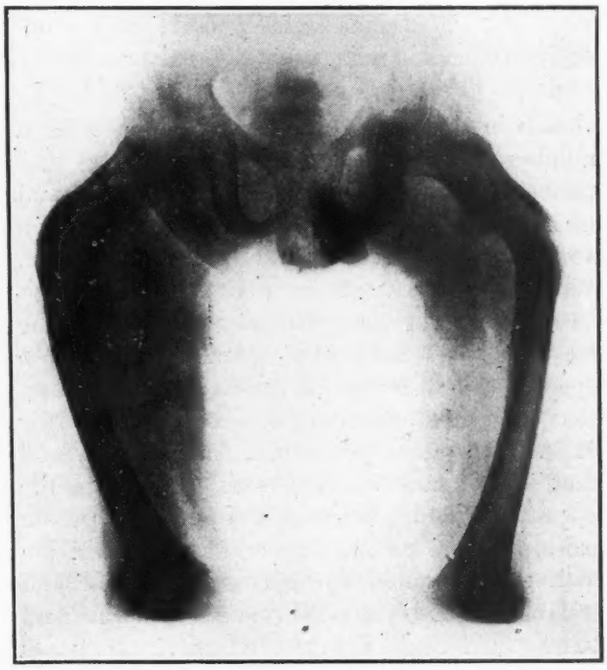


Chart illustrating the extraordinary form of intermarriage which resulted in the birth of the two boys.

Examination. Rather fat boy, considerable panniculus. Face pale and pasty; mucous membranes anæmic; hands broad, but bones well formed and apparently normal. Long scar on front of left leg; leg slightly shortened; teeth good; throat slightly reddened; the isthmus of the thyroid palpable; no other glandular enlargements. Heart, lungs, abdomen and other systems apparently normal. Urine:—1020-1030. Acid-

clear amber. No albumen. No sugar. Microscopic examination negative; crystals of calcium oxalate were noted on one occasion. The blood count showed red blood cells 4,260,000; leucocytes 10,400; hæmoglobin 70 per cent. Smears normal.

Wassermann.— 4-3-20 O. (small specimen).
8-3-20 trace
10-3-20 O.



Both femora form arch with shaft just below lesser trochanter, neck of bones horizontal, shafts vertical. Bone thickened with obliteration of medulla just below lesser trochanter giving the appearance of an old fracture, particularly so on the left side. Cortex narrow.

Report of Dr. Rabinovitch on Metabolism. There is no disturbance in nitrogen or salt metabolism. Output of calcium is equal to or faster than intake. Blood calcium slightly low. Résumé: Intake N 6·51. NaC 6 grms. CaO ·970. MgO Carbo-hydrate: There is no disturbance in carbo-hydrate metabolism. No glycosuria; no polyuria occurred. Blood sugar never reached the upper level and returned to the original level in less than three hours. Calcium Metabolism: Total intake of calcium ·943 gms. Total output of calcium ·324 gms. in urine. In stools, total of ·794 gms., leaving a balance of ·149 gms. Blood calcium 6.0 m. gms. per 100 c.c. Spinal fluid calcium 6·1 m. gms. per 100 c.c.

M. M., aged seven years. Born in Sydney, N.S. He was the third child: normal delivery; no forceps; nursed eleven months. First tooth at the age of ten months. No trouble weaning. Mother says he was never a strong child. Fed on half milk and half water with a little sugar. At age of one and a half years barley was added to the diet. This was gradually changed to an ordinary diet, the same as that of the rest of family. Mother says legs were perfectly straight, and that he started walking at eighteen months. At age of three and a half years fell from a gate and broke right leg, which was in plaster paris for six months. About three months later fell on kitchen floor and broke the other leg; since then has broken legs about eight times, always alternately. On one occasion broke left arm. He had measles at age of five years; whooping cough at age of three years. Two years ago tonsils removed. The last fracture occurred in March, 1919.

F. H. Same as Louis. Physical examination is not recorded as nothing of any note was found and in all essentials it is similar to that of his older brother.

Discussion. The cases reported are of interest because of the extraordinary form of intermarriage which resulted in the birth of the two boys —the sister escaped.

In the first case, the history of convulsions in infancy suggests the possibility of tetany. Late dentition, head sweating, deformity of legs, prominence of abdomen make it evident that rickets was also present.

The second case had perhaps a slight degree of rickets, but no evidence of tetany, and there is no reason for supposing that tetany or rickets are of ætiological importance, although they may be associated with the condition under discussion. No fresh knowledge has been gained from the physical examination, *x*-rays, metabolism or clinical laboratory findings.

References:

1. Lovett and Nichols.—*Brit. M. J.*, 2, 1915, 1906.
2. Schwartz and Bass.—*Am. J. Dis. Child.*, 5, 131, Feb., 1913.
3. Griffith.—*Am. J. M. Sc.*, 113, 1897.
4. Hess.—*Arch. Int. Med.*, 19, 163, Feb., 1917.
5. Bookman.—*Am. J. Dis. Child.*, 7, 436, June, 1914.
6. Mixsell.—*Arch. Pediat.*, 34, 756, Oct., 1917.
7. Eugenics Record Office Bulletin No. 14
8. Wise, W. D.—*J.A.M.A.*, 73, 1696, Nov. 29th, 1919.
9. Fraser, J. S.—*Proc. Roy. Soc. Med.*, (Sect. Otology) 12, 126, Aug., 1919.
10. Johannessen, A. and Eiken, T.—Hospitalsid, 62, 193, Feb. 12th, 1919, ab. 72, 1403, May 10th, 1919.
11. Mayer, L.—*Ann. Surg.*, 69, 360, April 1919.
12. Donaldson, H. H. and Conrow, S. B.—*Am. J. Anat.*, 26, 237, Nov., 1919.

NOVOCAINE IN SURGICAL OPERATIONS

A Clinical Report of 459 Operative Cases in which Novocaine was used as a Local Anæsthetic

H. S. Sharpe, M.D.

Brandon

THE report here submitted refers to a number of cases that have occurred in the surgical experience of Dr. W. A. Bigelow and the writer during the past few years, and in which the use of novocaine local anæsthesia has been found very satisfactory. It is not our desire to present a plea for the exclusive use of local anæsthesia in surgery, yet we feel that our results justify a wider use of this form of anæsthesia than is perhaps generally appreciated. A study of our cases, four hundred and fifty-nine in number, has been made, due consideration being given to its advantages and disadvantages. The cases studied do not include very minor ones such as office operations, nor do they include excision of superficial tumours, circumcisions, tonsillectomies, amputation of fingers and toes, simple laparotomies for tuberculous peritonitis, gall bladder drainage, or emergency work in case of acute bowel obstruction, but comprise those operative procedures where general anæsthesia has been and is now more or less extensively used.

Local anæsthesia in all our cases was produced by the use of a solution of one-half to one-quarter of one per cent. novocaine, combined with varying amounts of adrenalin solution, 1-1000. The quantity used varied from a few drachms to twelve ounces. We have had no trouble with toxic symptoms produced by large doses of novocaine as far as we know. In fact, we do not know its full dose. We never hesitate to use large quantities of the solution, but are careful during the infiltration to keep the needle constantly on the move, thus changing the situation of the point to prevent the accidental injection of any great amount into a blood vessel. A few cases have been reported by others of trouble caused by the intravenous introduction of novocaine, but this is avoidable.

Local anæsthesia in these selected cases was chosen in preference to general anæsthesia for a number of reasons. It is a well-known fact that patients fully realizing the importance and necessity of operative treatment often delay on account of the fear of a general anæsthetic. When the patient can be assured that it is not necessary to be rendered unconscious, that he may converse with the operator during the operation, tell stories or exchange adventures, that there is no post-operative vomiting, no fear of post-operative inhalation pneumonia, and that at the same time all sense of pain in the operation area is abolished, the fear of operation pales, and the patient approaches the operation with greater confidence and with less fear and trembling. Especially is this so in hernia and hæmorrhoid cases, many of whom in this series had been sufferers of such conditions for years simply because they dreaded the general anæsthesia. True, in spite of this assurance some still entertain the traditional fear of the theatre, but this can be palliated or entirely overcome by a preliminary hypodermic of morphia.

Again, with those patients, who, after examination are found to be presumably bad risk for a general anæsthetic, whether it be due to an associated pathology in the heart, lungs, kidneys, or elsewhere, the use of the local anæsthesia allows the operator to approach his work with greater confidence, and no fear of the possible complications arising out of general anæsthesia.

The comparative hæmostasis produced by local anæsthesia aids greatly in allowing the operator to identify readily the various structures as he proceeds.

Dissections of fascial or other tissue planes is greatly facilitated, especially where a good infiltration anæsthesia has been done. This advantage has been appreciated in the case of hernioplasties and perineorrhaphies.

Possibly one of the greatest benefits of the use of local anæsthesia from the surgeon's standpoint

Read before Surgical Section at Dominion Medical Convention, Vancouver, June, 1920.

is that it precludes rough handling and cultivates in him a healthy respect for living tissue, a lightness of touch, and a gentleness of procedure, all of which are so necessary in successful surgery. It is possibly on account of this minimal amount of trauma done that such good results in the healing of the wounds were experienced in this series of cases. The wounds healed apace with operation wounds made the same day in other cases done under general anæsthesia, and never in any case was there any reason to ascribe delay in healing, or infection, to the use of the local anæsthetic.

HERNIÆ—158 cases.

The largest group in this study of cases consisted of herniæ, of which there were one hundred and fifty-eight. Of these, one hundred and twenty-eight were inguinal, eighteen were femoral, and the remainder old post-operative ventral. The degree of pain experienced is the index of the efficacy of any form of anæsthesia, and we wish to state that with a little knowledge of nerve supply, coupled with care in the preparation of the novocaine solution and its administration, the operation for the repair of hernia is painless after the first insertion of the needle. Hard rough traction productive of pain, and which is avoidable, must not be charged against the anæsthesia. Again, it was found important to include thoroughly in the infiltration the subperitoneal tissue, as it is through this area that the peritoneum derives its sensibility, the visceral surface being totally insensitive.

In an ordinary hernia we use four to five ounces of the solution. If the hernia is double we use double the quantity, as in all such cases, whether inguinal or femoral, we repair both sides at the one sitting.

In strangulated hernia we have felt particularly encouraged in the use of novocaine anæsthesia, presenting as it does the following distinct advantages:

First, no further shock is added to the patient's pre-operative condition.

Second, when in doubt as to the integrity of the strangulated portion of bowel after its release we have been able to take our time and apply warm saline compresses to the discolored gut during periods varying from one-half hour to four hours in one extremely bad and doubtful case where we fortunately did not have to resect. In three cases, however, this was not advisable, and resection was done painlessly.

Third, it has been noticed that the coverings of the hernial sac are less sensitive than in non-strangulated cases, due no doubt to pressure anæsthesia, and a minimal amount of infiltration is required.

So much interested are we in the use of local anæsthesia for hernia operations that we are now trying to do nearly all of such cases in this way. Its use has been in all cases gratifying to the patients, and in fact in many instances is requested.

The patients ranged in age from twelve to eighty-two years. The boy of twelve referred to was a manly little chap, who three weeks previously had had a tonsillectomy done under general anæsthesia, and when an option of local anæsthesia was presented to him for the repair of his hernia he quickly decided that he would take no more ether. After his operation, and while being wheeled into his ward, he remarked, "If I ever need to have any more operations that is the way I want them done." We have had no experience with children under that age. The other extreme of age was in an old man of eighty-three with a strangulated inguinal hernia. On account of his general condition it would have been utterly impossible to have used a general anæsthetic, and under the use of novocaine a herniotomy was done, the hernia repaired, and the man enjoyed life another four years.

Briefly the technique in inguinal hernia is as follows as shown in Plate 1.

At a point about three-quarters of an inch internal to the anterior superior spinous process

PLATE I.

of the ilium an intra-dermal wheal is made using an ordinary hypodermic syringe and a very fine needle. Through this wheal a long slender needle attached to a 10 c.c. glass syringe is inserted and piercing the subcutaneous fascia one can readily feel the point engage the resistant aponeurosis of the external oblique. This latter layer is pierced and a copious infiltration is made with the object of blocking the ilio-inguinal and ilio-hypogastric nerve trunks. This infiltration is continued downwards and inwards along the line of the proposed incision to the level of the external ring. In this latter area a thorough infiltration is made including the tissues of the cord. The infiltration extending along the line of proposed incision is made at varying depths so as to insure superficial as well as deep anæsthesia. This anæsthesia allows incision sufficient to expose the spermatic cord and the sac of the hernia. Further injection is required with a fine needle to anæsthetize the genital branch of the genito-crural nerve high up in the cord so that the latter may be painlessly dissected from the sac. It is also advisable to infiltrate the sub-peritoneal tissue at a slightly higher level than the neck of the sac so that the latter may be isolated thoroughly preparatory to ligation.

Hæmorrhoids—91 cases.

The second group in which local anæsthesia has been tried out comprised 91 cases of hæmorrhoids. This operation is absolutely painless after the first prick of the needle. Associated with hæmorrhoids various other rectal conditions were treated, such as fissure-in-ano, rectal polyp, and fistula-in-ano. In the more simple cases this latter condition is readily taken care of under local anæsthesia, but where there is multiple tunnelling or the presence of acute infection, general anæsthesia was considered preferable. In a considerable number of cases there seemed to be more post-operative pain with local anæsthesia than in those done under a general anæsthetic. This disadvantage can be readily met by a hypodermic of morphia.

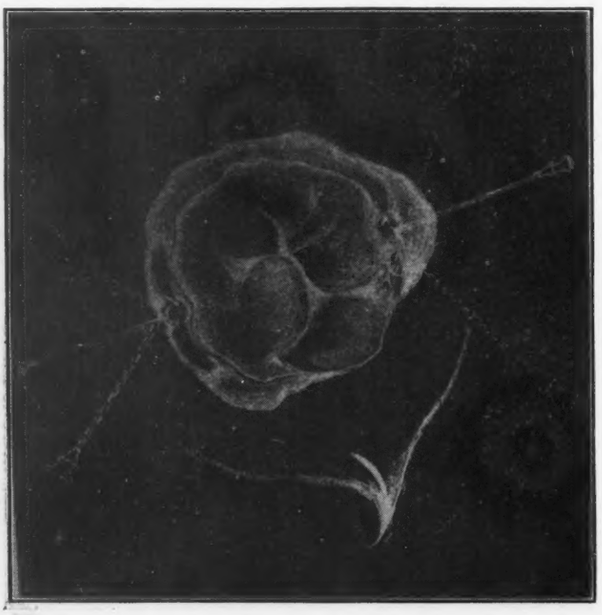


Plate II.

The technique as illustrated in Plate 2 is as follows:

After the pile has been demonstrated a small needle is used in anæsthetizing its mucocutaneous base. Through a wheal so formed the needle is inserted deeply into the base of the pile and half a drachm or more of the solution usually suffices for this infiltration and allows the operator to make the necessary dissection and to apply the ligature. To render the first prick of the needle comparatively painless we often apply a drop of pure carbolic acid on a probe to the site of injection.

Appendiceal Operations—23 cases.

This group of twenty-three cases consisted of both chronic and acute types, as well as abscess cases. In six of these cases appendectomy was done either deliberately through a McBurney incision, or while repairing a hernia, the appendix having appeared in the sac. Our experience in such cases would suggest the use of local anæsthesia only in those well walled-off abscess cases, where the patient is extremely toxic, or where the condition is complicated with a bronchitis or a pneumonia. In all other cases of this type we prefer a general anæsthetic.

Colostomies—15 cases.

This operation was painlessly done in each of the fifteen cases of this group. The indication for the operation in all the cases happened to be for obstruction due to carcinoma in some part of the colon, the four last cases being done as a preliminary measure in carcinoma of the rectum before resection.

Operations on Thyroid Gland—32 cases.

Ligation of the superior thyroid vessels was done in thirty-two cases, double ligation in all but three of them was done at the same sitting.

It was found that a preliminary hypodermic of morphia was of great value in allaying the nervous apprehension of the patient.

PLASTIC GYNÆCOLOGICAL OPERATIONS—35 cases.

These consisted of perineorrhaphies and plastic operations for the repair of the anterior vaginal wall. It is only within the last year or so that this form of anæsthesia was tried in our clinic in these cases, and results amply justified its use in the selected cases. The ease with which dissection of tissue planes is done, and the comparative hæmostasis commend its use. In those women, who, on account of age or because of bronchial conditions are unsuited for a general anæsthetic, its use is instrumental in bringing about a great deal of comfort otherwise unobtainable. The only disadvantage found was that during the cleansing of the operative field with tincture iodine considerable discomfort of a stinging burning character was complained of.

In perineorrhaphy the pudic nerve is blocked on either side by deep infiltration into the tissues containing its branches. For repair of cystocele an infiltration is made through the anterior vaginal mucosa into the fascial layers lying beneath, care being taken to direct the anæsthetic solution between these layers and not deep enough to enter the bladder. Plate 3 illustrates the technique.

SUPRA-PUBIC CYSTOTOMY—41 cases.

This procedure was done in forty-one cases, either for the removal of stone in the bladder, or as a preliminary measure to prostatectomy.

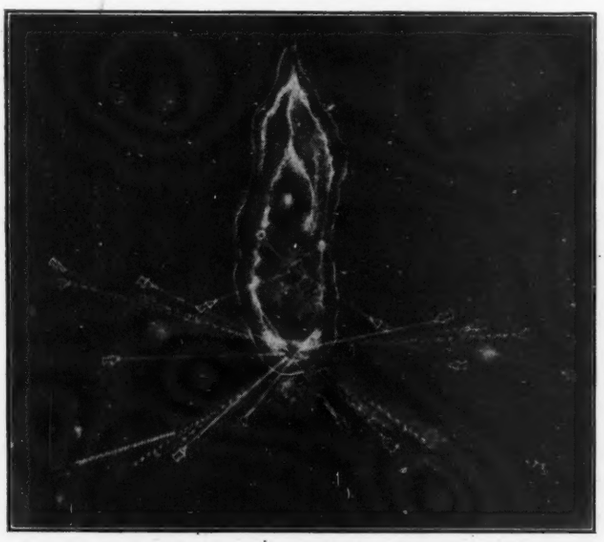


PLATE III.

Local anæsthesia is especially appreciated in old men with complete or almost complete obstruction. The operation is absolutely painless, and is by us always preferrably done by this form of anæsthesia.

OPERATIONS ON TESTICLE AND CORD—33 cases.

This group includes hydrocele and other tumours of the testicle, epididymis, and cord.

RIB RESECTION—31 cases.

The advantage of local anæsthesia in rib resections for empyema is conceded by all, and should not in most cases be done any other way. Children as young as eighteen months have been operated upon for this condition by this method. There is no occasion for any pain whatever after the initial thrust of the needle.

TECHNIQUE FOR RIB RESECTION—

A series of intra-dermal wheals is made with an ordinary hypodermic needle along the line of the proposed incision. Through this area infiltration is made into the subcutaneous and muscular tissues down to the periosteum of the rib. To complete the anæsthesia, a long slender needle is used to block the corresponding intercostal nerve posterior to the proposed resection site as it lies under the protecting edge of the rib.

In the use of novocaine local anæsthesia the following conclusions were arrived at from a study of the foregoing cases:

ADVANTAGES

1. Less shock.
2. Operations are painless.
3. Absence of post-operative emesis.
4. Dissection facilitated.
5. Comparatively bloodless operative field.
6. Elimination of dangers of general anæsthesia, especially in associated heart and lung pathological conditions.
7. Elimination of fear of general anæsthesia on patient's part. In fact, it is frequently asked for by patient.
8. Patients are able to co-operate with surgeon both before and during operation, so that comfortable placing on the table is assured, and post-operative backache is avoided.
9. Nourishment may be taken immediately following operations, except in special cases, important in itself and also indirectly by the forestalling of post-operative acidosis from starving.

10. Ileus of bowel less frequent.
11. Healing of wounds not interfered with.
12. Cultivation of careful handling on the part of the surgeon.

DISADVANTAGES

1. In acute infections the infiltration is not desirable.
2. Nervous and apprehensive patients make poor subjects for its use, and should have a general anæsthetic.
3. Most children for similar reasons should have a general anæsthetic.
4. Discomfort of preparation of operative field where irritating antiseptic agents are used.

CHRONIC INFECTIONS OF THE NASAL ACCESSORY SINUSES WITH TOXIC ABSORPTION

L. DEV. CHIPMAN, M.D.

St. John, N.B.

WHILE in recent years much has been written about infections of the accessory sinsues, I do not think that their importance is even yet recognized by the profession as a whole; as witness the large number of cases which are either neglected or wrongly treated. When we consider that these sinuses are in direct continuity with an organ peculiarly liable to traumatism and infection, we do not wonder at the frequency with which they are involved in nasal inflammation, and, likewise, when we study the position of these accessory sinuses (two of which are without gravity drainage, and the others often supplied with insufficient or easily obstructed exits), we see that they are ideal fields for focal absorption.

Sinus infections naturally fall into two main divisions. Those with manifest discharge, and those without. Those with discharge are comparatively easy to diagnose, and are now seldom overlooked; but the second class still presents many puzzling problems. To aid in their consideration, cases without discharge may be divided into fairly typical groups.

(a) Those with mechanical obstruction in the nose as the underlying cause. (b) Those in which bacterial infection seems to be the main feature. (c) Those in which there is a hyperplasia of the bone and mucous membrane linings.

The first group, with mechanical obstruction as the underlying cause, presents a very typical picture. Usually these cases have not gone on to actual focal absorption, but, as they are in the incipient stage, they may well be included in this paper. The patient complains of a full, stopped-up feeling in the head, frequently with frontal headache, which is worse in the mornings, or on taking cold. There is a history of numerous colds in the head, and of a chronic catarrhal discharge that persists between the colds. There is more or less difficulty in nasal breathing, especially on lying down at night. On examination the nose presents a deviation high up in the septum, often pressing against the middle turbinate on one or both sides; the membranes are hyperæmic and swollen; and one or more of the turbinates enlarged. There is either no discharge or only a slightly watery one. On shrinking the membranes with cocaine and applying suction, frequently a glairy mucoid or muco-purulent discharge may be seen coming down from under the middle turbinate. The patient feels immediate relief, and can breathe freely. With a high, thorough sub-mucous resection the relief becomes permanent; the membranes gradually assume a healthy aspect; the colds occur less frequently; and we have a very grateful patient.

The second group of cases, those in which bacterial infection seems to be the main feature, is marked by definitely toxic symptoms, elevations of temperature, increase in pulse rate, digestive disturbances, and general depression, with other symptoms common to toxic absorption from whatever source. Frequently there is some nasal obstruction, but not necessarily so. There

may be nothing discernible at the outset; but persistent, repeated examinations, especially in the mornings, will usually be rewarded in time by the discovery of a transient discharge. Bacteriological examination often aids in the diagnosis, streptococcus hæmolyticus and staphylococcus aureus being the predominating organisms, in my experience.

The class of cases presenting symptoms caused by hyperplastic inflammation and pressure, is thoroughly discussed by Sluder in his book on "Headaches and Eye Disorders of Nasal Origin". He reports a very complete series of cases of hyperplastic sphenoiditis. In these cases the symptoms are usually due to involvement of the nerve trunks in close anatomical relation to the sphenoid; and we have "maxillary neuralgia," with pain in the teeth, eyes, and temple; or "vidian neuralgia," with pain referred to the ears, neck, shoulder and arm. Many cases of migraine have been traced to this source, and often the patient complains of headaches persisting over years.

The diagnosis here is difficult, and requires careful and persistent study. In the early stages, thick and adherent discharge may be seen at the outlet of the sphenoid; but frequently no discharge is discoverable; and in very many cases the outlets of the posterior ethmoidal cells and sphenoid are not to be seen by any method of inspection. We have, then, in the majority of cases to depend on the recognition of changes in the appearance of the mucous membrane, by interpreting its colour, thickness, translucency, and vascularity in relation to the normal. A typical hyperplastic picture shows some increase in redness, with more or less thickness of the membrane, and epithelium. The vascularity is increased, manifested by the presence of macroscopic vessels.

In this group the ophthalmologist and the rhinologist meet on common ground, as optic nerve disorders often arise secondarily to hyperplastic bone changes in the sphenoid region. Less frequently the oculo-motor is involved, giving rise to a dilated or sluggish pupil, with asthenopia, for which the ophthalmologist can assign no reason. Sluder says that hyperplastic sphenoiditis and ethmoiditis is a frequent lesion in childhood, and the history of many cases supports this view. Recently a boy of ten years came into my office with a complete right oculomotor paralysis, ptosis, a dilated pupil, and divergent strabismus. The trouble started with a severe cold in the head three weeks previously. Examination showed a profuse muco-purulent post-nasal discharge, with the naso-pharynx almost filled with adenoid growth, and the tonsils greatly hypertrophied. With the removal of the adenoids and tonsils, followed by suction applied to the nose, the symptoms rapidly improved, and at the end of ten weeks, had entirely disappeared except for a dilated, sluggish pupil, I regard it as highly probable that the nerve as it passed through the spenoid fissure was involved secondarily to a sphenoiditis. The frequency with which cases of phlyctenular conjunctivitis are associated with profuse mucopurulent nasal discharge, and the rapidity with which they clean up after the discharge is cured by the removal of adenoids, followed by suction, indicates a close connection with sphenoethmoiditis in these cases.

Perhaps the best way of illustrating these classifications will be by presenting a few typical clinical pictures.

Case 1. Mrs. M., aged thirty-five, was first seen in January, 1919. She gave a history of nasal discharge resulting from an attack of la grippe two years previously, and of exacerbations with every cold in the head. She was extremely toxic with evening rises of temperature of 103°; pus pouring from the nose; and both ears infected. The acute symptoms subsided under irrigation, followed later by suction. *X*-rays showed a large, dull left frontal sinus. Nasal examination of March 17th revealed a profuse purulent discharge from the anterior ethmoidal region, with staphylococcus aureus as the infective organism. The septum was deviated to the left high up.

Complete recovery occurred in this case in six weeks following a high submucous resection with free opening of the frontal sinus.

Case 2. Mrs. S., aged forty-five, was first seen by me in March, 1919. Since 1909, when she contracted an acute nasal infection, she had been suffering from recurring seizures of pain and headaches; the pain being between and around the eyes and aggravated by change of position. There was a slight elevation of temperature with these attacks, accompanied usually by a serious discharge. The condition was several times pronounced hay fever. Two months previously an acute tonsilitis was followed by pain and throbbing in the left side of the face. The whole head felt dull and heavy.

The initial inspection showed no discharge,

but on repeated examinations, after shrinking the mucous membrane with cocaine, a small amount of sero-purulent discharge was obtained by suction. This showed coccus hæmolyticus. *X*-rays revealed involvement of the left antrum and frontal sinus. In this case all pain and symptoms ceased in six weeks following intra-nasal opening of the antrum, frontal sinus irrigation, and the administration of an autogenous vaccine.

Case 3. Mrs. F., aged thirty-five, complained of headaches mainly in the left parietal region; and of diminution of vision in the left eye. For the past two months she had been suffering from frequent colds in the head, with persistent sneezing and a profuse watery discharge. There was also loss of weight and slight febrile reaction on exertion. One week ago she noticed that she could not read with the left eye.

Anterior rhinoscopy was negative, but posteriorly the left middle turbinate was seen to be reddened and thickened, as compared with the right; no discharge. The left pupil responded feebly to the direct test, readily to indirect; vision 20–200 left; 20–20 right. A large central scotoma in the left eye. Fundus entirely normal. Wassermann and urine negative. *X*-ray: clouding of the ethmoid cells on the left side.

Operation, February 20th, 1918. Radical intra-nasal ethmoid exenteration and opening of sphenoid. No pus found. March 2nd, 1918, vision 20–50, and central scotoma much reduced in size. March 25th, 1918, vision improved to 20–30, scotoma relative, and disc showing pallor on the temporal side. May 25th, 1919, vision 20–20, and J.I. There remained slight pallor of the temporal side of disc, but the fields were entirely normal.

In the study of chronic sinusitis, of course, other sources of toxic absorption must be considered. The teeth, tonsils and intestines, e.g., may give rise to toxicity, and obscure the picture.

In trying to formulate conclusions from a study of sinusitis with toxic manifestations, one has to emphasize local conditions, as all toxic diseases have symptoms in common. There are a number of characteristics which take prominence in these cases and may aid in diagnosis. In drawing the following conclusions I wish to acknowledge my indebtedness to Dr. J. A. Mackinity, with whom I was associated as house surgeon at the Manhattan hospital.

As in other branches of medicine, an accurate, detailed history is of prime importance. Usually if traced back to the first onset, the symptoms will be found to originate in an acute nasal or tonsillar infection.

Exacerbations and remissions are characteristic of the history of most of the cases, until they finally sink into a state of chronicity.

Pain in the head is usually present at some time during the trouble, and more often noted on the affected side. It may be frontal, parietal, or involve the neck and shoulders.

Headache as distinct from pain in the head is often a marked symptom. Many cases of migraine have been traced to chronic sinusitis.

Mental depression, irritability, and inability to concentrate are frequently present.

There is frequently a daily rise in the temperature to 100 or 101 degrees, and this is heightened by exercise.

The importance of a thorough study of the eye in these cases is not yet so fully appreciated as it should be. Frequently a carefully taken field will give the key to the situation, when all other diagnostic methods are indefinite. Markbreiter reports the study of the visual fields in one hundred cases of empyema, all cases in which the eye itself manifested any change which might cause visual field disturbance being excluded. Visual field changes were found in seventy of the hundred cases, although the fundus, in each cases was normal, and the vision perfect.

After a study of the literature of this subject, and of my own cases, I feel that we are merely on the threshold of the possibilities of this field. Most of the nerves supplying the head and face pass within a confined space in the sphenoid region. The interweaving connections between the different ganglia and systems are very complex and difficult to trace; but, as our knowledge of them and their pathology increases, many cases now set down as neurasthenias, neuralgias, and tics, will be found to be due to definite lesions. Let us hope that in the future we shall not be compelled to be content with such diagnosis but shall be able to trace each symptom to its source.

THE CAUSATION OF THE PSYCHONEUROSES

GOLDWIN HOWLAND, M.B., M.R.C.P. (LONDON)

Toronto

I. THE DEFINITION OF THE PSYCHONEUROSES

THE psychoneuroses, to be clearly understood, must be separated from the other great groups of nervous diseases, and this is easily accomplished, by viewing all the diseases of the nervous system from three standpoints, such a division being based, on the pathological condition.

There is in the first place a large group in which the pathological changes are definite to the eye in the post-mortem room, and in which the tissues are attacked as a whole, so that there is no selective action on the nerve cells, or fibres, but cells, fibres, connective and vascular stroma are together affected. To this group the name of gross organic disease is given, and its localized action described as encephalitis, in the case of the brain, as myelitis in the case of spinal cord, and as neuritis where the nerve is the structure diseased; while, where a more generalized condition is present, the inclusive diagnosis meningo-encephalo-myelo-neuritis is well applied.

In the second place, there are those diseases in which the nerve cell, or fibre, is selectively affected, by a toxic, or other primary cause, and from this large group a division into two sub classes must be made, namely, on the one hand, into a group, where the signs of permanent structural damage is definitely present, and which may aptly be termed the degenerative group, and on the other hand, into a group where the clinical evidence is in favour of some definite metabolic change in the cell, frequently of congenital origin, or produced by some cause which while altering the cell nutrition, yet allows recovery to occur.

No apt terminology has been given for this important division of nervous diseases, and with hesitation the suggestion is brought forward to term such disease in the brain as encephalocellosis, in the spinal cord as myelocellosis, and in the nerve as neurocellosis, with a nomenclature for the more generalized cases (comparable to the name given in the gross diseases) of encephalo myeloneurocelloses having as two sub classes the degenerative and non-degenerative.

Finally we have the third pathological class, that under discussion, "the psychoneuroses", which includes all those conditions in which there is no actual disturbance of the metabolism of the cell, but where the clinical signs are due to faulty physiological action, pure and simple, and with removal of the cause which must be a physiological one, a return to normal conditions should occur.

This classification on a pathological basis may be appended as follows:

1. The encephalo myelo neurites.
2. The encephalo myelo neurocelloses.
   (a) Non degenerative.
   (b) Degenerative.
3. The psychoneuroses.

It must be added, that no fine distinguishing line can separate any division as all of these classes merge gradually from one into the other.

In considering the classification of nervous diseases, there is an old error, that has for centuries been a stumbling block to a proper and intelligent study of the whole subject, and which must be absolutely allowed to disappear from scientific works, and this error is the use of the terms nervous and mental. All the diseases of the mind are physical, there is no room for a separation into nervous and mental, and psychosis should be applied to every condition whether mild in degree, as in a psychoneurosis or more severe, as where metabolism is affected.

The fact, that individuals vary from one another, and that the same cause brings out different functional characteristics, or weaknesses, which also will vary in degree, is a fundamental condition that must be remembered.

The confusion brought about by these two terms is especially noticeable in these gross organic diseases, where the mental faculties are affected, since here such a case is stated to be a nervous case at one moment and a mental at another.

With the abolition of these two divisions, the relationship of normal individuals, congenitally below normal, and finally the dementia præcox classes, becomes clearly defined and the parallel nature of the clinical signs of these types, becomes valuable in the study of the physiological activity of the brain.

II. Normal Physiological Action in the Nervous System

In order to understand both the causes and the physiological disturbances in the psychoneuroses, it is necessary to have a working method of approaching the subject, and this implies a clear recognition of what a normal individual is, and how such a normal person manages his nervous system.

All the physiological disturbances which characterize the psychoneuroses are properties of the healthy person, but they are only present to a degree commensurate with normal action, and compatible with ordinary daily life.

They vary greatly in their degree of intensity in each of us, and form the characteristics which make us individually different. Even the advanced changes, which are found in the more serious congenital nervous cases, may at times be noticed in daily life. For instance the negativism of the dementia præcox is characteristic of the untrained child, and has its by part in the foolish obstinacy of many adults.

The burden of nervous inheritance is so widely distributed, that to examine any person carefully, implies to find in him a tendency to abnormal development in some physiological direction which if it were allowed to increase would determine him to be a psychoneurotic, of a mild or even advanced degree.

The boundary between normal and abnormal is not fixed, one passes over gradually the border line, and it is perhaps best to decide the limitations of the normal, by giving the limits of the abnormal, and to lay down the rule, that the psychoneurotic patient is one who has so marked physiological disturbance that he cannot or can only with difficulty lead the life of a normal individual, and only then for a brief period.

The second question namely, as to how a normal individual manages his nervous system, is composed of two separate considerations; on the one hand arises the important issue as to what are the sources of the material which nervous activity is to function upon, and on the other hand, the mechanism of the action.

(*a*) The sources of stimuli, largely arise in the world outside of us either from affective sensory processes, or more frequently in the thoughts that are conveyed to us from other individuals. These psychic contents from individual to individual are of the greatest importance, for while they may form but a basis to add to our general information, and be stored in memory, yet on the contrary they may be composed of material that will be of the greatest importance to our lives and may be associated with great emotion. Similarly, the simpler sensations, optical, auditory or general, may produce serious disturbance in the psychical or somatic centres.

Another source of our activities comes from our memories, and here again the character of the supply will be very varied, and the selection we make, will have a great influence on the physical condition.

The final source comes from our body energies, and largely from the visceral organs by the sympathetic. Normally the greater number of these sensations does not enter the threshold of psychical sensation, and it is only under certain abnormal physiological conditions, that we become hyperconscious of a greater inflow of these stimuli.

II. By the mechanism of nervous activity we mean a condition in which the nerve cell or functionally associated groups of cells are vital living individuals and in continuing this paper the discussion will be limited to those cortical cells engaged in psychical action, and which are therefore defined as those vital living cells engaged in psychical activity.

This psychical activity exhibits itself in three main directions, it is able in the first place to concentrate on a definite stimulus presented to it, in the next place to associate this stimulus with other which are stored up in memory, and in the third place, it is capable of inhibiting extraneous stimuli that are of no value to the subject.

These three predominant qualities of psychical activity must be understood and followed, if one is to understand the development of the psychoneuroses.

We use these properties of psychical activity, in all the different functions of our mind. In our perceptions we must concentrate, associate and inhibit, to produce dependable memory, or

to awake past memories we again concentrate, associate and inhibit; while in the motor processes of our mind, in judgment and volition, we must again concentrate, associate and finally inhibit.

It is the defect in this great vital activity that is the ground work of the production of the psychoneuroses.

Another important normal activity must now be laid stress on, is that while there are individuals who can keep two or more mental processes equally active at the same time, yet with most of us, it is only possible to keep one mental process clearly in focus, but there is frequently a second, or even a third, that is being used, but less clearly. For instance we eat, walk, run, and perform other functions at the same time as we talk; or we may keep a subordinate thought in the sub-psychical realm, while we are more actively interested on another theme.

People vary in this regard, and there are those who are very marked sub-psychicals, and who even with the inhibition of the highest psychical activity, still continue to perform normal processes sub-psychically.

Take one case as an example that is of interest, where a lady at six one Sunday morning became sub-psychical, and dressed, went to church, returned home, ate her breakfast, telephoned her friend and at 11 o'clock became active psychically again and was unconscious of all that she had done in that time. Below the subpsychical realm there are also many other centres, whose independence is comparatively great as compared with higher sub-psychical centres, over which the highest centre possesses the power of increasing action by concentration and of preventing action by inhibition (the power of active association being lessened or absent as the lower centres are reached).

Again, it must be realized, that we have the ability to change the psychical activity from the subject that at first was of greater interest, and to focus the mind on an activity that was formerly sub-psychical, or was from the visceral group, and the new focus of thought becomes the active one, and the former active process becomes of lowered psychical value.

The lower centres are constantly receiving stimuli of a reflex nature, and the action of these stimuli produce their result without our being aware of their occurrence.

In the sub-psychical areas the same is true, and affective stimuli may enter this field and be responded to without our realizing their presence, this being a characteristic of many individuals, and even the highest psychical processes may be so affected by outside stimuli and the person may not actively concentrate, associate and inhibit them. Such a condition is the highest form of reflexicity in a nervous system, and as it explains the different degrees of suggestibility. and becomes of great importance in individuals where the psychical activities are not well developed or educated.

III. The Causes of the Psychoneuroses

Before discussing the actual exciting causes, it is necessary to refer to the two great basal predisposing influences that underly so many psychical disorders.

In the first place there is education, which includes all those influences that a child is brought under, both at home and at school, which tend to form the character of the adult. The importance of education is, therefore, almost of incalculable value, and the greatest care must be taken to examine the influence it may have had, in producing the patient's symptoms.

The second condition to which we are all subject and from the effect of which we cannot escape is that called instinct. Instinct is always active in all our sub-psychical thought, and at times it is the source that determines the course of action which we pursue.

The strong man controls his instincts, but when his health, be it mental or physical, shows impairment, then the basic instinct may take control, and decide his action.

Discussion over the value of this quality is important, and must be left over, as this paper deals, more with the active and acute causes rather than the basic conditions.

The first and greatest group of the active causes may aptly be termed the neurogenetic, since it includes all those conditions which are the result of over-exercise, or of mal functioning of the varied nerve centres.

Under this class, there are three separate groups, namely, the psychogenetic, where the cause is due entirely to psychical action, and it may be added that this is by far the most important group, in the next place we have the reflexogenetic, where continued stimuli produce by their action a change in normal stability; and finally that class of cases where a visceral organ,

by reason of its own excessive activity, leads to disturbance in the general function of the nervous system.

The Psychogenetic Causes of the Psychoneuroses

Following the line of thought presented under the study of the normal individual in regard to the source of stimuli, and the psychical activities normally exercised in using them, the following may be taken, to represent the most common causes, in the production of the psychoneuroses:

I. Sudden psychical shock such as may be produced by the news of the death of a relative, or the actual visual presentation of equally acute conditions, are as important to the individual as if one had been struck on the head by a club. Curiously there is at times no emotional factor present as there has not been time for that to occur, although its presence is often a relief to the strain.

These sudden shocks are the most typical form of external stimuli causing physiological changes.

II. The next most frequent cause represents a combination of both external and internal agents and it is relatively common.

Overmental work may be due to prolonged exposure to thought stimuli, which are transferred actively through the mental processes to a motor outflow, as for instance in the work of stenographers and telephone operators who frequently break down from sheer overstrain, but it is interesting to compare the steady mental effort of the professor, or the business man, or the lawyer, whose constant application, year after year, which in the absence of even any emotional factor, will produce a psychoneuroses, noting that the source of the mental food will in many of these cases originate as much or even more from the memory processes as from external impressions.

III. Perhaps the next cause will appeal to more of you than the last two.

The home associations are largely associated with external stimuli as a source, but show also an internal origin, when we consider, how frequently these associations are recalled during the day.

The business girl returns home, the actual house is perhaps dull, the surroundings mean and sordid, the conversation of the other inhabitants annoying, or the food distasteful, and this going on from day to day becomes an irritant.

Much more frequently it is the individuals themselves at home that cause the overstrain, the father may drink and this arouses all the pride that the girl may feel to prevent her friends realizing the fact; again there is over and over again a definite lack of sympathy, or a true mental dissimiliarity in tastes and ideas between the mother and son or daughter, perhaps the mother is depressed or irritating, or too fixed in her ideas of control, and as a result the home life is full of bickering. This condition applies well to ill assorted marriages and to badly arranged parternships in business, and to clerical relationships where the views of parson and congregation do not fit well together. One must lay stress on the point that these are external stimuli but that their great effect is due to the fact that they are retained in sub-psychical thought, and frequently recalled to active consciousness as the individual wishes, or is forced to do so by active association.

The rôle of the physician is a very difficult one here, in settling the muddles of life and one must realize that the emotional content may vary according to the type of case, and all grades accompany the condition from annoyance to hatred, and this subconscious emotion is very serious in its effects.

IV. An entirely different causative factor is to be found in the fact that many workers go home at night to a solitary room, have few if any friends, and may not occupy their brain in any definite way.

As a result they develop the habit of introspection, which means that they become hyperconscious of their own thoughts, or in other cases of their own somatic and visceral realm. Naturally one must remember that this introspective tendency is congenital in many cases, and also it is one of the fruits of all conditions that lead to the psychoses, but in the case outlined it may itself be the cause of the disturbances, and it must be classed as a type where a neuropsychosis is produced by faulty direction of the psychical activities. The absence of the healthy stimuli set up by normal conversation with other people, and the monotony of examining our own sources of thought, and especially when a paucity of memories or a sensation of loneliness is present, intensify the acuteness of this important cause.

V. A peculiar basis for the psychoneuroses which is seldom referred to, and which follows well after solitude, is the reading of other people's thoughts in books. I have been struck by the number of cases of people who have been injured while in an introspective condition, who have developed a psychoneuroses from reading books on literature and particularly those on Christian science, as also the varied sexual literature that haunts civilization. Unable to understand what they read, and evolving wrong psychical conclusions with the effort of trying to digest literature above their ken, has resulted in the production of very trying forms of nervous disturbance. You read a book above your intelligence and your brain as one is accustomed to say becomes addled, and that is the development of psychical strain.

VI. The next cause which comes to our attention is based on the following disturbance and may be called "unsatisfied wishes". Some desired objective presents itself to the mind, very frequently the desire to obtain some important wish, which will vary with the individual and his age. To the child it may be a gift that has been withheld, to the student an examination which appears the greatest objective in his life, to the older girl the desire for attention or a husband, and to the woman a child, while her husband may equally have a similar wish.

The business man longing for wealth, or the politician for success, while as age advances the wish to be gratified may lie in the success of the children at school or in life.

VII. Another cause of psychogenetic disorders is similiar to the last and it is dependent on the failure to attain the object desired, the failure in the pursuits, that have been deified. These failures are usually far more intense in their reactions than the former class as there is frequently associated with them a great deal of emotion and the particular type is that varying from disappointment, to depression and to despair, and which if allowed to continue may produce a metabolic change and an advanced psychical condition follow. On the contrary with the unfulfilled wish the emotional side cannot be often depression, as the final attainment is in doubt, but there is rather either a sense of anxiety or a more serious emotion varying from annoyance to anger, which will cause a greater degree of physiological change.

VIII. Contrary in its emotional content is the feeling, that comes with the satisfactory attainment of desire, or with undue success, and even here the individual may be lifted above a level basis in his mental condition, and have a psychoneurosis produced.

IX. The division is one of the greatest importance and has been given by some unwisely as a separate psychoneurosis while it is only a cause.

A long period nursing a sick child or relative, or a long unsettled business venture or simpler affairs of life as the care of a family, or the strain of work during college, with the question of final result, all these and thousands of other like conditions are very likely to produce a psychoneurosis and it must be remembered that the emotional association is that called anxiety which grades into another far greater emotion, namely, that of definite fear. Fear is characteristic of all those conditions in which the psychical activity is unable to bring the questions that enter consciousness to a clear and definite conclusion.

Fear is a by-product of nearly all psychoneuroses, for as the nervous stability of the individual becomes upset by ungratified wishes, by failure in attainment, by sudden shock, by joy and by anxiety the condition of the mental activity is such that the person becomes inquisitive and often deeply introspective of the question, What is the matter with me? Am I going insane? and finding no answer to his queries the fear element increases and there is established a vicious circle, in which morbid thoughts flourish.

To these varied causes of the psychoneuroses one must now bring forward a very important difference and that is this. In some such as these due from great shock or definite overwork, the cause may be immediately apparent, but from time to time there develops a very important result, namely, that the actual cause becomes forgotten, or is purposely sunk and inhibited in psychical activities, and the person still suffering from the psychical neuroses is absolutely unaware of the true cause. On the other hand it must be acknowledged that while apparently the person is not conscious of the cause yet in truth they may realize what it is, and either wilfully or unconsciously withhold it from their physician, particularly where the wish or anxiety is based on a subject that they personally do not wish to disclose.

The Reflexogenetic Causes of the Psycho-Neuroses

This type of cause is easily understood, as it is a matter of daily experience, that acute pain will produce a generally increased nervous condition, even a severe toothache causing a neurotic condition that may last some days. At the time of the menstrual period it is customary to see many forms of psychoneurotic disturbances that are caused by the pain of a dysmennorrhœa. On the other hand, we are prone to neglect the fact that there are cases where the pain is only discomfort, but which has persisted for a long period, and that this is equally possible as a cause of the nervousness, naturally one must take great care in deciding that the discomfort is not part of the nervous condition but is primary in the organ itself.

Instances of this are common, as for instance chronic indigestion causing the patient prolonged annoyance, will gradually bring about a general nervous condition, but it must be distinguished from those cases where the sympathetic is itself abnormally active or inactive, and the distress is due to the resulting failure from this cause and not due to primary gastric disease since the treatment must be absolutely different.

Another very common and neglected cause is a chronic pain in the back due to mild arthritis, often associated with septic teeth and which may be accompanied by slight nerve root symptoms, and the annoyance of this condition which has produced the whole psychoneuroses has been disregarded by the physician who has been completely occupied with the neurosis and considered the cause as a symptom of the general condition.

The third great neurogenetic cause is the viscerogenetic class, where pure overaction of the visceral organ leads to direct nervous disturbance and not by reflex means alone.

Excess gastric and intestinal action may prove to be a source of exhaustion by itself, prolonged over action of the heart not only causes nervous disturbance through the consciousness of the person but through the sympathetic exhaustion. Perhaps the most definite type of this class is the sexual type where, while one must recollect that increased hyper-irritability or exhaustion may be primarily psychogenetic, where the individual allows his thoughts to rest too much on this sexual line of thought, or may be reflex where masturbation is a principal cause, yet there is a true exhaustion brought on by actual over frequent masturbation or by too frequent sexual intercourse with a resultant sympathetic exhaustion which in its turn saps the strength of the whole nervous system. This is truly a type of overaction primarily in the visceral region with its secondary effect on the nervous system.

This then concludes the three groups of the psychogenetic causes and before proceeding further the question arises: Does neurogenetic disturbance produce the more advanced condition of a metabolic change. There can be no definite line drawn between the psychoneuroses and the cell changed diseases, the encephalocelloses, because one passes into the other, and there is no doubt in my mind but that long continued worry or excess stimulation can produce a typical metabolic condition, but I believe that in these cases another factor comes into play that must be considered as the prime cause, namely that of inheritance.

The fact that there is a certain type of individual whom we term as normal, and that we must accept under this heading people who vary a great deal in their normality, and that these classes pass into the groups where these abnormalities are so marked and so definite, that while we still look on them, as normal mentally, yet their physiological idiosyncrasies are so definite and their reaction to psychogenetic and other stimuli so easily produced; and, above all, recognizing the fact that the nervousness has occurred early in life, and is associated with a family trend of marked degree, renders the placing of all these congenital cases in the class of non-degenerative encephalo celloses.

But again remember that there is no distinguishing line between these metabolic neuroses and the psychoneuroses proper, and that the physiological effects of worry in the congenital cases are the same as in normal people, but appear more easily, advance to a greater degree, and enable us to pass on to those more severe types the dementia præcoxes.

Besides these two great classes the neurogenetic and congenital many other causes may produce perhaps a definite psychoneurosis such as toxæmias and infections, but theoretically at any rate such causes must primarily affect metabolism, and it is best to discuss them entirely under this class of cause.

Under vasculogenetic causes, arise many con-

ditions which produce gross organic disease, as under such types as thrombosis and hæmorrhage; and also many forms of metabolic change, as for instance where there is disturbed nutrition where arteriosclerosis is the root condition; but one must also add to this long summary of the causes of the psychoneuroses the fact that temporary vascular spasm may produce functional disturbance, which, however, if long continued will lead to graver organic disease.

In concluding this paper on the causes of the psychoneuroses it is necessary to urge the physician in treating these conditions that he must make the greatest effort to ascertain the cause as until this is found there is not a great probability of successful treatment.

APPENDICITIS—HIGH MORTALITY IN PERFORATED CASES

E. M. Eberts and L. H. McKim

Montreal General Hospital

APPENDICITIS is a disease which, if early relieved by operat on, runs a comparative'y short course, is practically never fatal, and is attended with few, if any, after effects. And yet hospital statistics especially in these later years of standardization and improved clinical records, show that appendicitis is the surgical disease, par excellence, which most often exceeds ts normal period of hospital detention, and that it has a death rate quite out of proportion to the seriousness of the initial symptoms.

An exhaustive study of two hundred and sixteen cases of appendicitis operated upon in "L" Service at the Montreal General Hospital, during the two years ending June 30, 1920, shows conclusively that the unfavourable results are to be attributed directly to delayed surgical intervention.

In the tabulation of the clinical histories and results of treatment of these cases there were four points which stood out with special distinctness:

1. Of the acute cases 44 per cent. were perforated.

2. Wound infection developed in 95 per cent. of the perforated cases, but in only one per cent. of the non-perforated cases.

3. The perforated cases were in hospital more than twice as long as the non-perforated cases.

4. There were no deaths in the non-perforated cases but 16·9 per cent of the perforated cases died.

If we admit, as we must that perforation is an avoidable complication of appendicitis, these figures constitute a very serious indictment against the medical profession.

There are, of course certain factors which render delay in procuring surgical aid almost inevitable. In remote rural districts, for example, a doctor is not always immediately available; then frequently, especially if the symptoms do not seem alarming, there is hesitancy on the part of the family to accept the doctor's recommendation of removal to hospital on account of the expense which they do not wish to incur unless it is absolutely necessary; and lastly, train service may be limited to twenty-four hour intervals.

There are, however, other factors which make for delay, which can and should be eliminated. It is, for instance, a common practice to prescribe a purgative for a patient who complains over the telephone of abdominal pain —a prescription for abdominal pain which should never be ordered before a careful physical examination has been made. The exhibition of morphine, also, in the treatment of appendicitis is responsible for a large percentage of the fatalities In the series above referred to, several cases had received morphine for from one to six days before admission, and there was one fatal case which had been kept under morphine for fourteen days before admission Then too, while the general practitioner usually diagnoses the case correctly, he frequently fails to assess accurately the significance of the physical signs and symptoms and the general trend of the disease. It is unfortunate that many practitioners do not think that a case

is running an unfavourable course unless the temperature is high, a palpable mass is present, or vomiting supervenes. The fact that the pulse rate amounts from 70 to 80 to 90 on succeeding days goes unheeded, and consultation is postponed until the symptoms become alarming. The result frequent y is perforation.

While the results of operation in perforated cases are much better than they were twenty or even ten years ago, the fact remains that perforation is attended with grave risk to life, prolongs suffering and disability, and is frequently the cause of post-operative sequelæ such as ventral hernia, painful adhesions and intestinal obstruction, which ater necessitate further surgical intervention.

It can not be that this hospital is unique in having to deal with so many cases of appendicitis with perforation It must be a continental-wide experience, and therefore of more than local interest. The remedy lies through the joint action of the members of such a constituted body as the Canadian Medical Association. The difficulties of individual propaganda are obvious. If it were only recognized, both by the laity and the profession, that there is no curative medical treatment for appendicitis, the death rate and the number of post-operative infections would be reduced to the irreducible minimum, and a serious load would be lifted from the already overweighted public services. We are very hopeful that a Special Committee of the Canadian Medical Association may be named to invite the co-operation of the provincial medical associations in gathering statistics upon this subject, with a view to naugurating a propaganda which shall have as its goal the acceptance by the public and the medical practitioner of Sir William Osler's dictum: "In appendicitis a surgeon is never called too soon—frequent'y too late.'

THE FUTURE FUNCTION OF MODERN MEDICINE

H. W. Hill, M.D., D.P.H.

Dean, Faculty of Public Health, Western University, and Director, Institute of Public Health, London, Canada; Chairman, Committee on Inter-relations of the Ontario Medical Association

APPLIED medicine as we conceive it to-day, is an all-inclusive term, covering every form of therapeutics, medical and surgical. It has to do then with every form of adjustment of the sick body to its surroundings, and with every form of adjustment of the surroundings to the sick body. Therefore it is in brief the hygiene and the sanitation of the sick—dealing with those special physiological and environmental conditions which produce pain or damage and which we, therefore, call disease. Applied medicine is peculiarly individualistic because it deals with the individual peculiarities of the physiology and the individual peculiarities of the environment of the particular individual who is in trouble. There is no way in which applied medicine can be applied wholesale. The individualistic practitioner of medicine is an essential which can never be done away with so long as individual persons become individually sick.

Public health, on the other hand, deals primarily with the hygiene and the sanitation of the well; that is of those whose physiology and whose environment are of a fairly uniform and ordinary pattern—and because of this uniformity, public health as distinguished from applied medicine can be carried out on more or less wholesale lines. Thus both public health and applied medicine are fundamentally hygiene and sanitation, but they constitute two ends of a scale—corresponding to all degrees of physical condition from the highest health to death. The connecting links are preventive medicine and epidemiology, those two branches of medicine of which the first, preventive medicine, is a special technical branch of hygiene and deals with medical and surgical measures directed to furnishing the body with new protective mechanisms like vaccination, removal of tonsils, etc., which are preventive of threatened disease rather than curative of disease already existing; the second of which, epidemiology, is a special technical branch of sanitation

and deals with the removal from the surroundings of the environmental causes of disease themselves.

There is no real break in the series from public health to medicine. Convenience and custom, tradition, the demands of human nature for relief from existing evils, have developed the disease-treating end of the scale to the highest point, it is true, but, carefully considered, public health through preventive medicine and epidemiology, fuses with therapeutics by almost imperceptible gradations. Yet there is a fundamental distinction after all; sociological, however, rather than medical. That distinction is this—medicine proper deals with the patient, primarily, for his own good; public health deals with the patient, primarily, for the good of others. For instance, medicine cares equally for the typhoid case and for the diabetes case to preserve the particular individuals from dissolution. Public health cares for the typhoid case to prevent the injury of others; it pays no attention to the diabetes case, for the diabetes case cannot hurt others.

Such at least is our present conception. But while the diabetes case cannot hurt others in a direct biological sense since the specific disease, diabetes, is not transmissible, he does hurt others in a sociological sense, through the expense, diversion of energy, sorrow, etc., which his disability involves. Not only are his own services lost to his family and community, but to a greater or less extent the services of those who must care for and attend him are diverted from productive activities. No more striking illustration of this injury to the community produced by non-infectious disease can be offered than is involved in the military maxim—it is better to wound an enemy soldier than to kill him; for an enemy killed reduces the enemy forces only by one; but an enemy wounded reduces the enemy forces by two, three or four—that is, by the wounded man himself and also by those companions detached to care for him. Medical and nursing work applied to the sick person are unproductive in the economic sense, in the same sense that the medical service in the army is not a fighting unit. Only such measures as actually promote health and increase efficiency can be regarded as positive productive activities, like making shoes or growing vegetables. The physician and the nurse are repair people, not manufacturers. But it is a curious thing to note that those who have to do with patch work, repair, the correction of evils, are those who constitute the learned professions; while the productive occupations are classified as trades. Thus theology deals largely with the injuries, defects and disabilities produced by sin; the law, with criminals; the army and navy, with human attackers and invaders; medicine, like the army and navy, with attackers and invaders, but other than humans—the minuter forms of life. We most of us look upon heaven as that ideal state in which there will be no doctors (or lawyers or soldiers or ministers, either), because there will be no need for patching up anything—production, not repair, will be the only activity.

If now we turn from the mere mechanics of the situation to the great principles behind the activities of medicine, we find, it seems to me, an evolution in the medical attitude towards disease, a change in the way of looking at things which curiously parallels similar evolutionary changes in other lines. This change is that which perhaps may be summarized, if it is not taken too literally, in the phrase, which recommends us to love our enemies rather than hate them. This doctrine is applicable even to medicine, where our great enemy has been disease. To my mind, modern scientific medicine, in contrast to all the pathies and sects of the past, consists essentially in the conception that instead of fighting disease we should co-operate with it. What else do we do in preparing and using our vaccines and antitoxins than this? We do not fight the germ; rather we discover what it wants and accede to its demands; thus satisfying it and at the same time ourselves escaping its attacks. In many other ways we now co-operate with disease instead of fighting it. We give our fever patients water as much as they wish—recognizing that their condition demands it, and acceding to that demand. This is quite contrary to the older practice of denying water to the fever patient—based on the principle that everything the fever required must be forbidden to it. If the fever patient wanted water, that fact alone proved that water was bad for him. This principle has been almost universal. If a child was hungry it was regarded, in the old days, as almost a physiological criminal—if a mental patient behaved obstreperously, we beat him and chained him up! It is not long since a teacher's only remedy for the stupid child was thrashing him regularly. Now we have changed our methods in all these directions. We secure the co-operation in treatment not only of the patient, but of the disease itself. This is because we have a saner view of medicine and disease. We see that what we labelled as

disease and thought of as a wholly abnormal process, conducted against the laws of nature in contravention of all right, is not abnormal, wrong, to be suppressed in every way and in all its manifestations, but a serious, logical and physiological, if often amateur and incoordinate, attempt on the part of the body forces to meet unusual physical, chemical, or biological conditions. Our duty is to help the body in its efforts to meet these conditions, or to remove the need for meeting them. We no longer say that if the patient is constipated, produce diarrhœa; if he has diarrhœa, produce constipation; if his heart is running fast, slow it; if it is running slow, hasten it. That truly allopathic form of blind blundering has gone out for a generation and we are now quite as much insulted by those who still obsoletely call us allopaths as by those who call us by any other term which is a relic of bygone darkness. Science is the knowledge of nature; applied science is co-operation with nature—and modern medicine is co-operation with nature in that field which we call disease.

I should like to apply these modern principles which we all accept as commonplaces in our own medical technicalities, to our sociological relations with the rest of human beings. We sometimes have considered our profession itself as a sort of sociological patient, suffering from various pains and aches within itself from some of its own defective or degenerate members; and subject also to attacks from outside invaders, in various guises. Too often we have applied to these "diseases" of our own profession the very principles of blind symptomatic treatment which, in our technical medicine, we have abandoned. Confronted with changes in conditions that have resulted in pain to us, we have given ourselves the morphine of neglecting and ignoring the situation; if the public situation has demanded of us a revision of our procedures in relation to the public, we have not enquired the reasons why such revisions were demanded, but have merely by force tried to maintain our sociological activities at the point which tradition taught us ought to be the normal. In fact we have, I think, too often committed the cardinal physiological crime of any organ in a body—that of failing to correlate our activities with those of the rest of the body, real or politic. The whole public, blindly suffering for the most part, finds itself so situated that the methods of practice of medicine suitable enough under old conditions require changes to correspond with modern life. To refuse to meet the needs of changed conditions would be as unreasonable as it would be to force the ordinary diet upon a diabetic, with the idea of correcting his diseased condition by stubbornly refusing to acknowledge the reasonableness of the demands of his body for a change suitable to his changed metabolism. Our modern principles of medicine demand that we shall study that diabetic in every detail and suit our treatment to his body, not force his body to comply with our conception of what is normal. Just so with the problems that confront us as a body politic. One man in about one hundred and sixty of the male adult population is a physician —we should not merely "hit a head wherever we see it" amongst the other one hundred and fifty-nine, if they propose some change in medical relations, however distressing such changes may at first appear. The heart might as well say to the pneumonic lung: "I don't care why you want me to change my gait—I don't care what the emergency may be that forces you to ask of me some service I am not used to giving—I will keep on just as I am—or quit."

Rather let us discover why the public want this change or that; why medical service of the old type is so obviously unsatisfactory; why chiropractors and others fill some sort of human want. If the public is getting a real service, we ought to find out why our own profession, which knows, like science itself, no limitations in its fields, should remain ignorant or inept on those points.

Very specifically I would ask that the Ontario Medical Association should most earnestly support and take part in this study of the pains and aches of the medical body; and should pursue its investigations with the idea of relieving the causes, not of merely jumping on and stamping out the symptoms.

All this applies to every form of problem that confronts the medical profession to-day, from Prenatal Clinics to Workmen's Compensation, and if the profession does not intelligently study and intelligently act, nothing but disaster can ensue.

Dr. Billing's recent paper in the *Journal of the American Medical Association*, hits the nail squarely on the head. If the medical profession is to exist at all other than as slaves to other bodies, it must do so by taking its own destinies in hand itself—and its own destinies lie now, as always, in its service to the race. If I may be still more specific and direct, let me cite as one minor instance the Life Extension Service recently

advertised in Canada. Is there the slightest reason in the world except apathy and lack of foresight, why every practitioner fit to make an insurance examination should not establish a Life Extension Service of his own? If this is for any reason not practicable in given cases, then why cannot a few medical men or a local society act to establish these services? They must be good services, honestly conducted, with conscientious work and the best skill, but these details we may assume. If the people want periodic examinations, and there can be no doubt as to the immense benefit to the race of such examinations, they are going to have them, somehow, sooner or later. If the profession, as a profession, does not act, some other body, public or private, will.

We are in a transitional stage of medicine. But we always have been and always will be. The medical man who looks back to the good old days of steady going practice or forward to the good new days of steady going practice, is a man doomed forever to disappointment. All life is transitional, always developing and changing. We recognize this in our medicine; in our medical and surgical practice; he who does not recognize it in such fields is already down and out professionally. He may not himself realize this, but all his associates do. Let us recognize the same thing sociologically—and let us meet the sociological changes with the same keen alertness that we give to our internal relationships—turning, as Kipling says, "Keen, untroubled eyes back to the instant need of things." We are doing our medical duty by the individual; the serious new sociological question is—are we doing our medical duty by the race?

The United States Army data showed 75 per cent. of men of draft age diseased or defective. School surveys show school children from 40 to 90 per cent. defective, while malnutrition affects 30 per cent. Persons of thirty to thirty-five, examined thoroughly at unexpected times, showed about 60 per cent. with defects serious enough for medical attention; unsuspected, by 93 per cent. to 96 per cent. of the sufferers. In Boston, 24 per cent. of dispensary patients had been sick three months or more before medical service reached them. In six surveys of wage earners, 30 per cent. of the seriously sick were found unattended medically. In rural districts the figure reached 53 per cent.

With such a situation, medicine as it is to-day is NOT covering the needs of the people. It is up to the medicine of to-day to do it.

CANADIAN MEDICAL ASSOCIATION MEETING, HALIFAX, JULY 5th-8th, 1921

TWO RARE ABNORMALITIES OCCURRING IN THE SAME SUBJECT —PARTIAL ABSENCE OF THE CORPUS CALLOSUM— THE STOMACH SITUATED ENTIRELY WITHIN THE THORAX

JOHN CAMERON, M.D., D.Sc.

Professor of Anatomy Dalhousie University,

AND

ALBERT G. NICHOLLS, M.D., D.Sc.

Professor of Pathology, Dalhousie University.

THESE striking and very rare anomalies were discovered in a girl, fifteen years of age, who was sent to a county home in Nova Scotia, with the following brief clinical note: "Idiot from birth; never developed mentally from childhood; fairly well developed physically. Conversation shows a childish type of mind. Answers questions in monosyllables, followed by a childish grin. Dirty habits."

We are indebted to Dr. J. W. T. Patton, who had charge of the case when in the home, for the short clinical history given below. He reported that "she was always a heavy eater, *e.g.*, for breakfast she would eat a large bowl of porridge and milk, with several slices of bread (all she could get), and several (pint) mugs of tea, if given her. The other meals were in proportion. She never showed any dyspnœa. Menstruation occurred every two or three months, and was very profuse, simulating a hæmorrhage and lasting a week. She was in good health until three weeks before her death. She complained first of headache, then of pain in the abdomen, which became greatly distended with gas. At first, there was diarrhœa, later, constipation. The temperature was variable, reaching at times 103°. She appeared to be improving, but died suddenly while being bathed." In regard to her mentality, Dr. Patton states in a later communication that she could neither read nor write, nor form words. Unlike children of her age she did not enter into conversation with other persons, but her remarks were chiefly restricted to answering "yes" or "no" to questions asked her. She had a doll which she sang to—chiefly rag-time songs, which she had picked up, and familiar hymns, but the hymns were all mixed up, and she never sang a hymn through. She would talk a little when a conversation was begun by some one else. She had little reasoning power, and was quite excitable, laughing and calling at the boys playing on the lawn. She was impulsive, rather than lethargic; not quarrelsome, timid, and afraid of the water and of strangers.

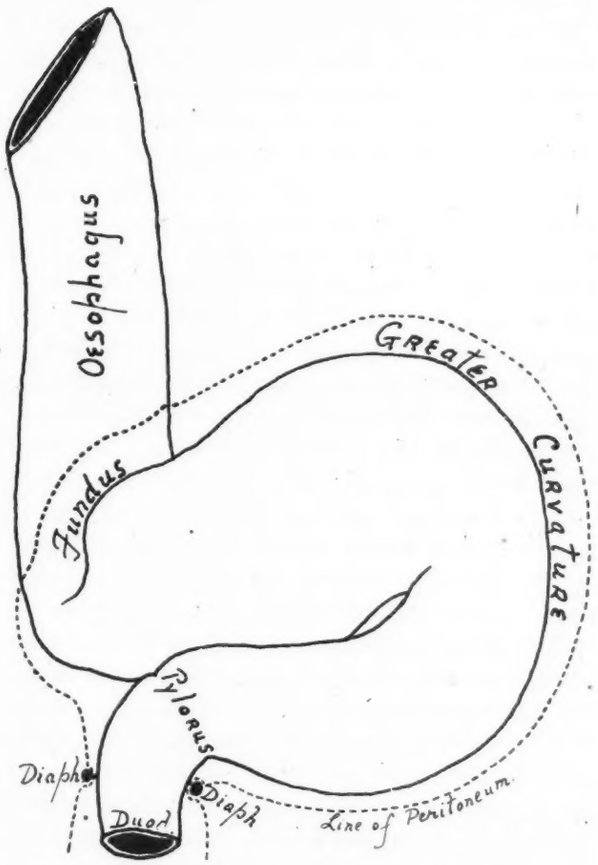
The body was sent to the Medical School of Dalhousie University for dissection, and was noted to be well developed and adequately nourished for that of a girl fifteen years of age. The external genitalia were well formed, both sets of labia being prominent, while there was a vigorous crop of pubic hair. The first abnormality was discovered by the dissectors of the abdomen, who reported that they could find no trace of the stomach. Exploration disclosed the fact that the duodenum, when traced upwards, disappeared into the thorax through what ought to have been the œsophageal opening of the diaphragm.

Upon opening the thorax the stomach was seen forcibly doubled upon itself, lying within a peritoneal sac situated between the heart and the inner surface of the right lung, and of course between the pericardial sac and the mediastinal pleura. This sac displaced the heart slightly to the left, and also gave rise to a deep permanent indentation on the inner aspect of the right lung below and behind its root, giving that organ, which chanced to be splendidly fixed by the formalin of the preservative, an extraordinary appearance. One could have thought, with

---

From the Editorial Board of Nova Scotia.

such reduction in the cubic space allotted to the right lung, that the individual would have evinced some embarrassment particularly after a heavy meal, but Dr. Patton was able to assure us that there was never any history of dyspnœa. This all goes to show how readily the respiratory apparatus can adapt itself to an abnormal condition of this kind.



Outline sketch of the stomach and of the lower end of the œsophagus, viewed from the right side. Note that the greater curvature is directed forwards and that the fundus is to the right of the lower end of the œsophagus. Three-fourths normal size.

The peritoneal sac that enlcosed the stomach was attached around the lower end of the œsophagus in the position of the dotted line indicated in the figure. Its attachment below was to the margin of the opening in the diaphragm, through which the elongated duodenum entered the abdomen. The muscular coats of the stomach were strongly developed and had become contracted owing to the effects of the formalin in the injecting material, so that there was no possibility of estimating the normal capacity of the viscus It was doubled upon itself in the most marked degree the œsophageal and pyloric orifices being in close apposition with each other. This disposition of the organ served to mark it off into two constituent portions (body and pyloric portion), these being further demarcated by a slight constriction in the region of the sharp bend. The greater curvature was directed for the most part forwards, while the fundus was indicated by a small cap-like bulging immediately to the right of the œsophageal aperture, at which point there was a very marked twist the latter no doubt having acted as a slight obstruction to the passage of the contents owing to its marked character. The position of the pyloric sphincter was fairly well defined.

The great omentum was very scantiiy developed, and practically devoid of adipose tissue. It was attached as usual to the greater curvature, and descended upon the right side of the viscus. Its lower margin hung downwards like a curtain around the duodenum, as it passed through the diaphragm, and projected into the abdomen to the extent of an inch. It is interesting to note that the fusion which normally takes place between the great omentum and the mesentery of the transverse colon during embryonic life, had been prevented in this case.

The gastro-splenic omentum was likewise feebly developed, and was attached as usual to the fundus of the stomach. It had perforce to pass through the diaphragmatic opening alongside the duodenum, in order to reach the spleen, which was normal in position.

The gastro-hepatic omentum was attached to the narrow cleft that represented the lesser curvature of the stomach, and was most scantily shown. Its abdominal portion, however, was attached to the duodenum and passed from that to the transverse fissure of the liver. The portal vein hepatic artery, and common bile duct, occupied their usual positions in the right free border of this omentum.

The upper end of the œsophagus was normal in appearance, but the portion situated in the posterior mediastinum was thin-walled, and dilated to about double its normal calibre, thus corroborating the previous conclusion that an obstruction had existed at its junction with the stomach. A significant fact was that the œsophagus was so short that its lower end only reached to a point 1·6 inches above the œsophageal opening of the diaphragm, suggesting that it had never occupied this aperture. It is therefore evident that the shortness of the œsophagus may have exercised an important influence in the

production of this extremely anomalous position of the stomach.

The first and second portions of the duodenum were of necessity much longer than normal, the distance from the pylorus to the opening of the common bile duct being 4·6 inches, instead of the usual 3 inches. The relation of the pancreas to the duodenum was practically undisturbed, and this viscus was normal in position.

The blood vessels to and from the stomach had of course to pass through the diaphragmatic opening in order to reach the thorax. This opening was thus rather tightly packed by the duodenum, these blood vessels and the three omenta. The duodenum, however, did not appear to be constricted in any way.

When one comes to consider the causation of this condition, several facts of developmental interest at once present themselves. It became evident at an early stage of the investigation that we were not dealing with a case of ordinary diaphragmatic hernia, seeing that the shortness of the œsophagus had apparently prevented its lower end from ever reaching the abdominal cavity. It therefore became manifest that we were confronted with a case where the stomach by some means or other had become located in the thorax within a persistent recessus pneumato-entericus. The latter, it may be explained is a diverticulum from the lesser peritoneal sac which extends upwards into the thorax in the early embryo, but normally becomes obliterated during the later developmental stages. We have been unable to obtain statistics bearing upon this remarkable condition. It is certainly the first of the kind we have encountered, and we feel that it must be a very rare one indeed, and there ore well worthy of being placed on record.

The position taken by the stomach was rather remarkable, for, as the figure shows, the greater curvature was directed forwards while the feebly developed fundus was to the *right* of the lower end of the œsophagus. In order to appreicate more fully what had exactly happened here, it should be explained that in the early embryonic condition the greater curvature of the stomach looks directly backwards At a later stage it swings over to the left while the lesser curvature or anterior border of the embryonic stomach gets swung over to the right, as a natural sequel. It is obvious that the stomach had swung in the opposite direction in this case, and in fact to an extreme degree, thus bringing the greater curvature directly in front. This would of course explain the pronounced twist at the junction of the œsophagus with the stomach.

The Brain. Upon opening the dura mater it was noted that the falx cerebri existed only at its anterior and posterior ends. It was of normal width at its point of attachment to the crista galli, while its posterior end was merely one inch and a half wide. The portion connecting the two ends was, however, reduced to the proportions of a faint ridge. The reason for this condition was at once manifest upon removal of the brain, for it was observed that the arachnoid bridged across the longitudinal fissure throughout almost its whole extent giving one at first the impression that the mesial surfaces of the hemispheres were fused together. In order to study effectively the condition of matters we decided to make a series of cross sections of the brain. Upon studying these it was noted that the anterior end of the corpus callosum immediately behind the genu was of normal thickness (·35 of an inch). About half an inch behind this point however, it faded away as a definite structure and was replaced by a lamina of grey matter at the bottom of the longitudinal fissure supported underneath by a thin layer of white matter and ependyma. As we proceeded backwards with the coronal sections, the cavities of the lateral ventricles became larger and larger, while the posterior horns expanded into cavities of considerable size (each 1·65 inches in height and 1·6 inches in width) and communicated freely with one another across the middle line. We therefore found evidences of the hydrocephalic condition which is usually associated with deficiency of the corpus callosum. It is a strange fact, however, that his distension should have affected mainly the posterior horns of the ventricles. The results of this distension were manifested by a compression and distortion of the longitudinal fissure, the lower end of which was definitely deflected to the right, and by three marked projections of the convolutions on the mesial surfaces of the hemispheres into the roof of this large cavity. The body of the fornix could be distinguished only at its anterior end. Its anterior pillars which were normally developed, could be traced as usual to the corpora mammillaria The posterior pillars, however, had become compressed upwards so markedly, that they had become merged into the roof of the large dilated cavity mentioned previously, and consequently could not be traced by the

naked eye into the descending horns. The septum lucidum and fifth ventricle were both absent. These it may be mentioned, are remarkable concomitant phenomena in cases of absence of the corpus callosum. The basal ganglia were well developed.

The most striking feature to be noted in reference to the fissures of the brain was the division of the fissures of Rolando into upper and lower segments, thus demonstrating a persistence of the embryonic form of this sulcus, which is developed normally in two portions, the latter becoming joined together during the later developmental stages. This division of the Rolandic fissure into two segments, it may be noted, is a common feature in cases of deficiency of the corpus callosum. The shorter upper segment cut the mesial border of the hemisphere very deeply on both sides, and much farther back than usual. It extended outwards 1·3 inches on the right side, and 1·2 inches on the left side, and was limited externally by a well developed gyrus. The longer lower segment, when traced upwards on the right side bifurcated to enclose the upper segment, while on the left side it swept upwards behind the upper segment, and very nearly reached the mesial border of the hemisphere The fissures immediately in front and behind the Rolandic sulcus were naturally much disturbed and distorted on both sides and the motor areas appeared to be poorly developed for the age of fifteen. The position of the angular gyrus could not be accurately defined. The parieto-occipital fissure, like the Rolandic, was placed much farther back than usual, being within one inch of the occipital pole; the result of this being that the occipital lobes of the hemispheres were much reduced in area The weight of the brain (after hardening) was 1030 grammes. Spironema pallidum was stained for, but with negative result.

A somewhat rapid survey of the literature relating to partial or complete absence of the corpus callosum shows that only about sixty cases have been reported up to the present time. The condition, therefore, is decidedly rare. The analytical study of the clinical features of this remarkable condition is peculiarly difficult. Where clinical histories are available they are usually lacking in those directions where we would desire precise information The following points however, seem to be established The majority of the patients died in infancy or early childhood. Few reached the twenties; one or two are stated to have been old. The majority, again, are noted as being backward at school, mentally deficient, or actually idiotic Occasionally, physical development has been retarded as well.

Left-sided spastic hemiplegia and generalized spastic paralysis are rather frequent clinical manifestations Epileptiform seizures either Jacksonian or generalized, have not infrequently been observed. Headache was complained of occasionally. In one case rapid enlargement of the head was noted. In regard to the very essential feature of apraxia we, unfortunately, have no information. The detection of disorders of co-ordination would, of course, be exceptionally difficult in the case of persons of weak intellect. It is worthy of special note that only two cases in the series were attended with no noticeable bodily or mental infirmity.

On consulting works on clinical medicine, even special works dealing with the nervous system, one is struck with the paucity of the information given in regard to the corpus callosum. This is, possibly, due to the fact that, as yet there is no unanimity as to the function of this structure, and pathological changes affecting it are comparatively infrequent. Tumours of the corpus are occasionally met with, but are undiagnosable with any certainty, for any clinical signs due to interruption of the communication between the two hemispheres by way of the callosal fibres are speedily masked by the more general features of brain tumour.

There is clear evidence that total absence of the corpus callosum can exist without any alterations in the physical and mental attributes sufficient to mark the individual as noticeably different from others who are entirely normal. In this connection we may cite the statement of Kaufmann (*Archiv f. Psych.*, xviii) tha complete interruption of the callosal fibres, resulting from embolism and softening, has produced no symptoms This would seem to support the opinion expressed by Dana ("Diseases of the Nervous System", 4th ed. p. 373) that the centres of each hemisphere for receiving visual impressions are almost independent and the centres for the memories, which are still more highly specialized are practically independent. We infer that the higher mental functions, therefore, work either in one hemisphere or in the other, that the two halves of the brain do not co-operate with each other in much of the higher intellectual work."

We may contrast this view with that of Bastian ("The Brain as an Organ of Mind", p. 485) who writes "that the more specialized emotional, intellectual and volitional regions in each hemisphere wherever they may be, and however they may be related to one another, are necessarily by means of the association system of fibres, brought into intimate communion with their corresponding sensoria regions of various kinds. It is in this way, therefore, that the higher functional regions of the two hemispheres may be brought into relation with one another through the medium of the fibres of the corpus callosum." So far as anatomical evidence goes, as one of us has shown in a former communication (*Can. Med. Assoc. Jour.*, July, 1917) Bastian's contention would seem to be supported.

A little reflection will show, we think, that these apparently opposed views are not really mutually exclusive. On the principle that in every organ there is an overplus of tissue beyond the amount requisite for the adequate performance of function, may it not be that structures of one hemisphere alone are all that are necessary for the ordinary motor sensory and intellectual needs of the individual. Such meagre evidence as we possess seems to indicate that the callosal fibres are of more importance in maintaining and governing the finer co-ordinations of muscular movement in the limbs of the opposite sides than in regulating the higher function of mentality Thus, apraxia of the homolateral hand has been shown to occur when there is an interruption of impulses which pass from the left cortex through the corpus callosum to the right cortex Such a lesion may be in the left hemisphere or in the corpus itself. A study of the recorded cases of absence, partial or total, of the corpus callosum will show that where there have been serious mental defects, there have been other gross anomalies of development of the brain, such as microcephaly, an embryonic type of the convolutions and their related gyri, or hydrocephalus interna. Some of these, such as porencephaly and hydrocephalus, are sufficient to account for the spastic paraplegia and epileptiform seizures which have been reported in these cases.

The association of congeni al anomalies of the brain with others occurring elsewhere is a subject of some interest. In the recorded cases of defect of the corpus callosum two associated developmental anomalies are recorded; in heterotopia of brain substance and cryptorchidism. The stomach condition in our case, so far as we are aware is unique It is not, as one might think at first sight, a case of true diaphragmatic hernia, but a much more unusual thing than even that rare condition, viz., a high position of the viscus. Some few of the developmental anomalies that occur in arhinencephaly, or example, such as absence of the nose and olfactory bulbs, cyclopia, are evldently related, being due to deficient vegetative force in the superior growing-point Others, such as hare-lip, cleft palate, malformation of the heart and great vessels, umbilical hernia, polydactylism, and defects of the diaphragm, are not, of course, explicable on such grounds. With respect to other anomalies of the brain it has been noted that in cases of hypoplasia, particularly of the fore part of the organ, anomalies of the adrenals sometimes occur. Crypt orchidism, reported in one case of absence of the corpus callosum, is common enough apart from any cerebral anomaly.

It may possibly be that disturbances of innervation, such as would result from such grave cerebral defects might exert a restraining influence upon the course of growth of other parts, but this is not in accord with a view, very generally held, that growth and function are to some extent mutually exclusive, function being largely in abeyance in an actively developing organ. It is hard to understand immature and imperfect nerve centres exercising any controlling influence over growth and development. It seems to be more reasonable to conclude that the occurrence of multiple anomalies of development in one individual are largely the result of chance, though a likely chance. Where one developmental anomaly is detected the odds are decidedly in favour of there being more than one. This seems to be supported by experience. As an instance we may refer to an autopsy recently performed by one of us upon the body of a child in whom there were no less than four congenital peculiarities; crypt-orchidism, megacolon, hypoplasia of the kidneys, and multiple cysts of the kidneys.

BIBLIOGRAPHY

JOLLY.—Balkenmangel, *Zeitschr. f. Nat. Med.*, Vol. 34, 1869.

HUPPERT.—Balkenmangel, *Archiv. f. Heilkunde*, 1871.

BRUCE, ALEX.—On the Absence of the Corpus Callosum in the Human Brain. *Proc. Roy. Soc. Edin.*, Vol. 15, 1888; also, *Brain*, Vol. 12, 1889-90.

DUNN, L. A.—A Case of Complete Primary Absence of the Corpus Callosum. *Guy's Hospital Rep.*, 3. S., Vol. 31, 117, 1889.

HOCHAUS, H.—Ueber Balkenmangel in menschlichen Gehirn. *Deut. Ztschr. f. Nervenheilkunde*, Vol. 4, 79, 1893-4.

ANTON, G.—Die Bedeuting des Balkenmangels für das Grosshirn. *Wiener klin Wochenschrift*, Vol. 9, 1031, 1896.

ZINGERLE, H.—Ueber die Bedeuting des Balkenmangels im menschlichen Grosshirn. *Arch. f. Psych.*, Vol. 30, 400, 1898.

MARCHAND.—Ueber den Mangel des Balkens in menschlichen Gehirn. *Berl. klin. Woch.*, Vol. 36, 182, 1899.

ARNDT and SCLAREK.—Ueber Balkenmangel im menschlichen Gehirn. *Arch. f. Psych.*, Vol. 38, 756, 1903.

BANCHI, A.—Studio anatomico di un cervello senza corpo calloso. *Monitore zool. ital.*, Vol. 15, 198, 1904.

CAMERON, J.—A Brain with complete absence of the Corpus Callosum. *Jour. Anat. and Phys.*, Vol. 41, 293, 1906-7.

SMITH, G. E.—On certain Peculiarities of Brains lacking a Corpus Callosum. *Journ. Anatom. and Phys.*, Vol. 41, 234, 1906.

DOUGLAS-CRAWFORD.—A Case of Absence of the Corpus Callosum. *Journ. Anat and Phys.*, Vol. 40, 57, 1905.

GOLDBERG.—Ein Fall von Balkenmangel im menschlichen Grosshirn. *Konigsberg i. Pr.*, 1905, p. 31.

HAUSHALTER ET COLLIN.—Malformations de l'écorce cerebrale avec agenesie du corps calleux. *Compt. rend. Soc. de biol. Paris.*, Vol. 58, 137, 1905.

VOGHT.—Ueber Balkenmangel im menschlichen Grosshirn. *Journ. f. Psych. u. Neurol.*, Vol. 5, 1, 1905.

GROSZ.—Microgyrie und Balkenmangel im menschlichen Gehirn. *Arch f. Psych.*, Vol. 45, 605, 1909.

KOZOWSKY.—Zur Frage über den Balkenmangel im Gehirn des Menschen. *Anatom. Anzeiger.*, Vol, 36, 580, 1910.

LASALLE-ARCHAMBAULT.—Contribution à l'anatomie et à la pathogène de la soi-disant agenesie du corps calleux. *Rév. Neurol.*, Vol. 18, 57, 1910.

LÉVY-VALLENSI ET ROY.—Etude d'un cerveau sans commissures. *Bull. et mém. anat. d. Paris.*, Vol. 58, 569, 1910.

MARCHAND, F.—Ueber die normale Entwickelung und den Mangel des Balkens im menschlichen Gehirn. *Abhand. d. math. Phys., Kl. d. K. Sächs. Gessellsch. d. Wissensch.*, Vol. 31, 371, 1909.

KOTSOVSKI—Absence of the Corpus Callosum from the Human Brain. *Journ. Nevorpat. i. psikiat.*, Korsakova, Vol. 10, 497, 1910.

LANDSBERGEN.—Ueber Balkenmangel. *Zeitschr. f. d. ges. Neurol., u. Psychiat.*, Vol. 11, 515, 1912.

STOECKER.—Ueber Balkenmangel im menschlichen Gehirn. *Arch. f. Psychiat.*, Vol. 50, 543, 1912.

SCHABEL.—Die Windungen und Furchen des völlig balkenlosen Gehirns. Rostock, 1914.

TUMBELAKA, R.—Das Gehirn eines Affen worin die interhæmisphäriale Balkenverbindung fehlt. *Folia neurobiol.*, Vol. 9, 1, 1914-15.

SOME RESULTS OF PROTECTIVE INOCULATION AGAINST EPIDEMIC INFLUENZA

GUILFORD B. REED

Professor of Bacteriology, Queen's University, Kingston

A CONSIDERABLE amount of protective vaccination against epidemic influenza has been carried out in this country; so far there has been no published statement concerning its success. The observations described below are not extensive; they constitute what controlled observations have been made from the use of a rather large amount of vaccine prepared in this laboratory.

During the first days of the first epidemic, October 1st, 1918, in Kingston, sputum or swabs from the naso-pharynx of a number of cases of influenza were examined bacteriologically with results similar to many that have recently been reported, namely, that B. influenzæ, pneumococci, green producing streptococci and M. catarrhalis were found.*

These four species were immediately used in the preparation of a mixed vaccine. The method of preparation was very similar to methods which have recently been published. From the several strains of the four species obtained ten strains each of B. influenzae and pneumococci and five strains each of streptococci and M. catarrhalis were selected and grown in pure cultures on the same media which was used in their isolation. This consisted of meat extract, peptone, agar, adjusted to P.H. 7·2, autoclaved, cooled to 85°, enriched by the addition of 2 per cent. whole rabbit's blood and plated at once. Plates were heavily seeded with a large platinum spreader and incubated twenty-four hours at 37°. The growth was then washed from the surface of the agar with physiological salt solution, using a suction apparatus, and collected in 500 c.c. flasks in the form of a concentrated emulsion, twenty to fifty times stronger than the final vaccine. These flasks of bacterial emulsion were then heated to 60° for half an hour and test cultures were incubated for twenty-four hours. The several strains of the four species were then combined and diluted as follows (with the addition of one-half per cent. phenol):

B. influenzæ, 300 million bacteria per c.c.

Pneumococci, 100 million bacteria per c.c.

Green producing streptococci, 150 million bacteria per c.c.

M. catarrhalis, 50 million bacteria per c.c.

It will be seen that this vaccine contained a larger percentage of B. influenzæ than the vaccine recommended by the British War Office Conference[2], and most of that used in the United States[1]. The majority of those described contained equal numbers of streptococci, pneumococci and B. influenzæ; some contained still fewer B. influenzæ. Rosenow, 1919[3].

In the cases reported the vaccine was used in two or three doses, as indicated, the first of 0·5 c.c. or 250 million, the second and third of 1 c.c. or 500 million organisms each, at forty-eight-hour intervals.

In most cases there was a mild local reaction following inoculation, frequently accompanied by headache and lassitude. In a very few cases there was a marked systemic reaction, some temperature, lack of muscle tone, increased blood pressure, distinctly suggesting convalescent influenza.

* Seventy typical cases of influenza examined bacteriologically during the first part of the epidemic, October, 1918, were found harboring the following organisms in the nasopharynx:

	Casse
Total number examined	70
Per cent. showing B. influenzæ	94
Per cent. showing Pneumococci	50
Per cent. showing Green producing Streptococci	56
Per cent. showing M. catarrhalis	31

TABLE I.—RESULTS FROM THE INOCULATION OF QUEEN'S MEDICAL STUDENTS WITH MIXED INFLUENZA VACCINE

	Number	Per cent.
Men in group not inoculated	51	..
Cases of influenza among men *not* inoculated, period October 1st to November 30th, 1918	22	45·3
Cases of influenza among men *not* inoculated, period December 1st, 1918 to January 31st, 1919	2	6·9
Men in group given three inoculations	142	..

	No.	Per cent.
Cases of influenza among inoculated men, period October 1st to November 30th, 1918.....	17	12·
Cases of influenza among inoculated men, period December 1st, 1918 to January 31st, 1919....	10	8·

Table I indicates the results of the use of this mixed vaccine with a group of one hundred and ninety-three medical students. These inoculations were given before any cases developed among the number and before more than a half-dozen cases had developed in the city, so that there had been little or no previous contact with cases. From a few days after the inoculations to the end of the epidemic practically all of these men were in close contact with influenza cases, acting as physician's assistants, nurses or hospital orderlies.

Of the fifty men who were not inoculated, almost half of them developed the disease, the majority of them during the two months of active epidemic. Many of the cases were severe, including several cases of pneumonia.

The one hundred and forty inoculated men apparently enjoyed a considerable degree of immunity, 12 per cent. of them developing influenza during the two months of the epidemic.

TABLE II.—RESULTS FROM THE INOCULATION OF PART OF THE MILITARY PERSONNEL, M.D. No. 3, WITH MIXED INFLUENZA VACCINE

	Number	Per cent
Men *not* inoculated.....	4668	..
Cases of influenza among men *not* inoculated	1012	21·6
Men inoculated, two or three doses	907	..
Cases of inflenza among inoculated men.....	7	0·8

These statistics were collected by Major S. E. Thompson, formerly Sanitary Officer M.D. No. 3.

Table II summarizes the results with the military personnel of this military district (M. D. No. 3). At the time of the epidemic there were several, mostly small, units in the district, those inoculated were in Kingston, Ottawa, Cobourg and Deseronto. The inoculations were voluntary and were elected by about 18 per cent. of the officers and men in the several units. In most units the inoculations were given before any cases appeared, in others a few had developed before any inoculations could be given.

In the two months period, October 1st to November 30th, 21 per cent. of the uninoculated developed influenzæ; a much lower percentage than in the previous group, probably as a result of less intimate contact with cases of the disease. Slightly less than 1 per cent. of the nine hundred and seven inoculated men developed influenza, indicating again a high degree of protection during the short epidemic period.

Table III contains the results of inoculation of about half of a group of three hundred and twenty-eight lumbermen divided among seven camps near Paisley, Ont. Approximately half the men in each camp were inoculated and half not inoculated. Previous to and after the inoculations both groups were under similar conditions. At the time the inoculations were given several cases were well under way, so that the inoculated men had been exposed and for a short period resisted infection.

During the period, October 15th, when the inoculations were given, to November 30th, 29 per cent. of the uninoculated developed influenza and a little less than 3 per cent. of the inoculated developed the disease. Even after these figures are discounted by the small number of cases which had developed before the inoculations were given there is, apparently, evidence of a large measure of protection from the use of the vaccine.

At the end of the epidemic, November 30th, a questionnaire was sent to all physicians in Eastern Ontario who were supplied with the vaccine prepared in this laboratory. Some thirty have replied with as definite reports as could well be expected under such circumstances. These reports are summarized in Table IV.

Of the twenty-two hundred inoculated persons from various districts, reported in Table IV, slightly less than 6 per cent. developed influenza. Twenty-eight of the thirty physicians sending reports state that according to their observations the cases among the inoculated were less severe than among the uninoculated. There were but two cases of pneumonia and no deaths reported in the inoculated group.

These results are inconclusive in that we have little knowledge of the percentage of cases in the general population of the various districts or how long some of these inoculated persons had resisted infection before the vaccine was used.

In addition to the data contained in the tables, many physicians have sent reports which correspond in general with those previously stated in showing that persons inoculated enjoyed a certain degree of immunity and that where inoculated persons later developed influenza it less frequently advanced to pneumonia.

TABLE III.—RESULTS FROM THE INOCULATION OF PART OF A GROUP OF LUMBERMEN IN CAMP NEAR PAISLEY, ONT

	Main Office	Mill 3	Bruce Mill	Camp 3	Camp 5	Camp 6	Pine Camp	Total
Number of men *not* Inoculated	0	30	15	10	65	55	0	175
Number of cases influenza among men *not* Inoculated	0	10	2	5	15	15	0	47
Number of deaths among men *not* Inoculated	0	0	2	3	2	0	0	7
Per cent. of men *not* Inoculated who developed influenza	0	33	13	50	23	27	0	29
Number of men Inoculated	20	25	0	53	10	15	40	153
Number of cases among Inoculated men	0	0	0	3	0	0	1	4
Number of deaths among Inoculated men	0	0	0	1	0	0	0	1
Percentage of inoculated who developed influenza	0	0	0	5·6	0	0	2·5	2·6

Dr. James Kaliel gave these inoculations and kindly supplied the data contained in the table.

TABLE IV.—RESULTS FROM THE USE OF INFLUENZA VACCINE COMPILED FROM REPLIES TO QUESTION BY THIRTY PHYSICIANS IN EASTERN ONTARIO

	Number	Per Cent
Persons inoculated	2194	..
Cases of influenza among persons who received three or two inoculations	104	4·7
Cases among persons who received only one inoculation	24	..
Total cases among persons who received one or more inoculations	128	5·8
Estimated number of cases of influenza among the general population of the several areas	5 to 50 per cent.	

The apparent favourable degree of protection indicated by these results is probably in part to be credited to the fact that the inoculations were given during the first few days of the epidemic and the results stated are simply for the short period of the one epidemic wave, the only one in this district.

In the first group, Table I, where the observation was continued for a second two months' period a very significant difference is to be noted. In this group during the two months' epidemic period, as previously stated, among the not inoculated there was a 45·3 per cent. attack rate and among the inoculated a 12 per cent. attack rate. During the succeeding two months, however, there was a 6·9 per cent. attack rate among the not inoculated and an 8 per cent. attack rate among the inoculated. It would appear therefore that these one hundred and forty-two men enjoyed a considerable degree of immunity during a period not exceeding two months, but that beyond that period they were quite as susceptible to influenza as non-inoculated.

CONCLUSIONS

1. In several groups of persons where part were inoculated with a mixed vaccine, B. influenzæ predominating, there was a 22 per cent. influenza attack rate among the not inoculated and a 3·2 per cent. attack rate among inoculated persons.

2. The vaccine used in these inoculations will not afford protection for a period longer than two months.

References:

1. Conference on Preventive Vaccination, War Office, London, *Lancet*, 1918, 2, p. 565.

2. VON SHOLLY, A. J. and PARK, W. H.—*Jour. Immun.*, 4, p. 103, 1921.

3. ROSENOW, E. C.—*Jour. Am. Med. Assoc.*, 73, p. 31, 1919.

THE TREATMENT OF ANÆMIA BY DRUGS

R. D. RUDOLF

Professor of Therapeutics in the University of Toronto

IN every case of anæmia it is our duty to try to find the underlying cause in order, if possible, to remove it. Very often this can be done and thus the condition can be treated radically. But in many instances the cause is obscure or irremovable, and then all that the practitioner can hope to do is to repair or to lessen its ravages upon the blood. Thus the treatment of anæmia is either specific or symptomatic.

These notes are limited to the treatment of the condition by drugs, but this is often the least important part of the therapy. The removal of the cause, the regulation of the diet and whole manner of living, the obtaining of a free supply of fresh air and sunlight, are all essential, and none of us would think much of the hypothetical physician who, when asked to treat a case of anæmia, would merely write a prescription for Blaud's pills and then collect his fee with the full self-assurance that he had done all that was necessary for his patient.

Drugs may be used both specifically and symptomatically in the treatment of bloodlessness.

Examples of the specific use are the giving of thymol or of oil of chenopodium for the relief of hookworm disease. These drugs do not make blood, but they kill the hookworms that have been bleeding the patient, and when this drain is removed the patient's own tissues soon supply the want. Again, in the use of arsenic in pernicious anæmia it seems as if we were a tacking the unknown infection that is producing the disease. Otherwise how does the drug act? Pharmacologically, arsenic does not increase the red cells, but does tend to increase the white ones, and yet in pernicious anæmia the erythrocytes multiply under its use; also, in leukæmia the administration of the drug causes a diminution in the number of white cells instead of the increase which occurs in the normal body under its use.

We know that arsenic has a specific lethal effect upon certain plasmodia, and hence it is probable that in these diseases (pernicious anæmia and leukæmia) we have some infection of this nature. In syphilis and in malaria we see arsenic and mercury, and quinine respectively relieve the blood condition, not because they make blood, but because they attack the cause of the trouble.

Anæmia can frequently be successfully treated by the removal of a toxæmia which is the cause of it. Perhaps one of the best examples of this is alimentary toxæmia, where, owing to stasis and infection, the amino-acids derived from the digestion of proteins are changed into toxic amines which may act as blood destroyers. Here proper dieting and the use of laxatives, and possibly to some extent the employment of intestinal antiseptics, may change the whole aspect of the case.

In regard to the symptomatic treatment of anæmia it is evident that if one could only put good blood into the vessels in place of bad all would be well, and this is what transfusion of whole blood does. When an individual is suffering from severe anæmia produced by hæmorrhage, and is so low as a result that life is threatened, this appears to be the ideal method of treatment. He has too little blood in his body, and although his blood-forming tissues may be doing their best to restore this, in the meantime he suffers from the loss, and transfusion meets this temporary need. During the war many lives were undoubtedly saved by this emergency expedient.

But the life-history of the individual red blood corpuscle is very short—only ten days, according to C. H. Bunting—so that all the cells introduced by transfusion will be gone in that time (and very likely sooner after all that they have come through). Thus, in all except anæmia from hæmorrhage the effects of the procedure are likely to be only temporary, although the temporary relief may give the patients tissues the chance of gaining some ground in their struggle to restore the blood.

It must be remembered, also, that the transfusion of blood has many other effects beyond the mere adding of so many corpuscles to the recipient's circulation. Thus, it acts as a stimulant to the hæmopoietic system, it increases the coagulability of the blood, it adds to the bacteri-

Given during a symposium on Anæmia at the Academy of Medicine, Toronto, December, 1920.

cidal or antitoxic properties of the blood and it improves the general nutrition.

In secondary anæmias where the colour-index is low, as each red corpuscle is insufficiently ladened with hæmoglobin, the drug that we most depend upon for the restoration of this iron-bearing compound is iron itself. The folk-lore in connection with iron is world-wide. The metal has always been recognized as perhaps the best of all spirit scarers. In India the bridegroom is armed with a sword of iron to keep away bad luck. Noise is much disliked by evil spirits and hence the value of the beating of iron tom-toms for the warding off of infection from villages. Church bells have a similar origin. But iron weapons are specially powerful, and when an Indian woman is confined these are laid across the doorway to prevent the entry of the spirits which may show themselves as puerpural fever and other complications of childbed.

Later, it was found that if pale people drank the water in which iron weapons had been placed until they rusted, they got better, so evidently the spirit of anæmia could be scared away by this method of attack, and such is probably the origin of the use of iron in conditions of bloodlessness.

Until the latter part of last century it was believed that iron therapeutically administered was absorbed by the alimentary tract, and then turned into hæmoglobin by the tissues. But Bunge suggested that this was not the way in which it acted. He believed that in chlorotic cases the anæmia was due to the fact that the iron of the food was acted upon by an excess of H_2S in the bowel, and thus turned into an insoluble sulphide which was lost in the fæces. When iron was given by the mouth it merely neutralized the excess of H_2S and thus preserved the food iron, which in consequence was absorbed. But it was soon found that the giving of bismuth and manganese, which would equally well neutralize the offending sulphides, did not relieve the anæmia, and, further, when iron was given hypodermically it acted equally well.

It is probable, that whatever be the form by which iron is given by the mouth, most of it is changed in the stomach into chlorides, and then into albuminates, and these pass into the duodenum where some are absorbed in solution, and others are precipitated as carbonates, and then are taken up by the epithelial cells and leucocytes, and thus reach the spleen and liver. Much of the iron, however, probably is not absorbed at all but passes on in the alimentary tract and is lost. That which is stored in the liver is changed into complex compounds which are doled out as required by the blood-forming tissues for the formation of hæmoglobin.

The whole body contains between 2.5 and 3.5 gms. of iron, and of this most exists in the form of hæmoglobin. If the amount be 3 gms. and one-tenth of the red blood cells are destroyed daily then the body will require .3 gm. of the metal each day to repair its loss. Now it has been shown by Stockman and others that food sufficient to preserve the iron equilibrium need only contain 5 to 10 mgs. or even less of this, and hence we must conclude that most of the iron set free by the daily destruction of red blood cells is either retained in the body and then again and again made use of, or if excreted into the bowel must be reabsorbed. The former is believed to be the chief way of its preservation. It is known that iron is absorbed only from the upper part of the small intestine and is excreted solely by the lower part of the large bowel.

An adult normal man possesses approximat ly five litres of blood and as he has about five millions of red cells per cubic mm. he must have in his circulation some 25,000,000,000 red cells. If one-tenth of these are destroyed every day, 2,500,000,000 will have to be produced each day in order to maintain his constant count. But in anæmia, as after a severe hæmorrhage, the production of red cells will necessarily have to be even more active than this, and hence more iron will be needed. It has been shown that a rabbit can produce 50,000,000,000 red cells in twenty-four hours in addition to those lost in the daily wear and tear. This increased production occurs through an extention of the red marrow, resulting from a differentiation of myeloblasts into erythroblasts, with the formation of new erythrogenic centres. This is noted in all anæmias except when the marrow reaction fails (aplastic anæmia).

Any factor which will check the formation of red cells will rapidly cause anæmia, just as much as an increased destruction of blood will do so. A man may be ruined either by the stopping of his income or by the overspending of it.

Whatever be the exact way in which iron acts, the great fact stands out that the giving of it tends to relieve those anæmias where the red blood cells are insufficiently charged with hæmoglobin, while, on the other hand, when these cells have individually sufficient hæmoglobin and the anæmia is due to a paucity of the red cells, then arsenic is the drug most likely to be of value.

Case Reports

SPONTANEOUS RUPTURE OF THE BLADDER IN PARTURITION

C. B. KEENAN, M.D.

Royal Victoria Hospital, Montreal

MRS. R., aged thirty-two years, delivered herself on September 3rd, 1920, of her fourth normal child by means of a dry labour lasting twenty-four hours, forceps not being employed. For the next thirty-six hours nothing abnormal was noticed by her attending physician but then, that is on September 5th, she commenced to have severe pain over the lower abdominal zone which remained constantly present and slowly increased in severity. At the onset of the pain she was given an enema which was slightly effectual but which did not relieve the pain in the slightest degree. A little later in the same day the patient was catherized and, according to her doctor, eight ounces of clear urine were obtained but this also did not give the slightest relief. Later more enemas were tried but none of them produced either stool or flatus, but according to her nurse she still continued to void urine normally. During this time her abdomen was becoming gradually distended and on September 7th, she commenced to have attacks of vomiting. There had never been any fever but now the pulse became rapid and feeble so that during the night intravenous salines were given. On the morning of the eighth a catherization of the bladder produced only a very thick bloody fluid. The patient was then seen by me for the first time, that is on the afternoon of September 8th.

I found her in a state of collapse with one degree of fever and a pulse so weak and fast that it could not be counted accurately. She was complaining of extremely severe pain in the lower abdomen and was vomiting very frequently. The lower half of the abdomen was distended and rigid and only a very little bloody urine could be obtained by the catheter. There was not any œdema of the legs. The diagnosis to me appeared to rest between that of a septic peritonitis and that of an extra-peritoneal rupture of the bladder. As the uterus and lochia seemed normal and as the fever was very slight and had appeared only lately I felt that the former could be excluded almost certainly and this left a ruptured bladder as the only cause of the patient's symptoms. I therefore operated as soon as possible using ether anæsthesia and making a right rectus incision in the lower abdomen. As soon as the skin was opened the subcutaneous fat was found infiltrated by bloody fluid with an evident odor of urine. This made the diagnosis of ruptured bladder certain, so keeping below the peritoneum the wound was deepened and a large opening was found in the bladder. This was simply drained and from this time onward the patient made an uneventful recovery being discharged with a healed bladder on October 10th. At present the patient is completely well and free from all urinary disturbances.

The cases of spontaneous rupture of the bladder in parturition are so rare that I thought this one to be worthy of recording. The fact that normal urine was obtained two days after the birth had taken place makes one think that the bladder did not rupture at the time of birth but rather that during labour the bladder was injured by pressure to such an extent that a portion of its wall died and then gave away about two days later.

POST-MORTEM DELIVERY

FERGUS J. O'CONNOR, M.D., C.M.

Obstetrical Clinic, Queen's University, Kingston

CASE.—Mrs. B. Admitted to Kingston General Hospital by Dr. Campbell, August 31st, 1920. Eight and a half months' pregnant. Threatened eclampsia-albumenuria-anurea—high blood pressure 220+. For one week she seemed to be improving, then on September 8th, about 4 a.m. pulse bounded to 160 with restlessness, twitching, delirium, etc. Dr. Campbell was called. He called me at once and I just got to hospital as first convulsion came on. When I saw this case she was already in the convulsive seizure which terminated fatally in one and a half minutes. This was her only convulsion and so quickly and so unexpectedly had the end come that no preparation was ready for anything. Some minutes were spent in efforts to determine if life was really extinct. Cæsarian section was suggested but no attempt made to carry it out. Then fœtal movements being plainly visible and the question of the child's life being established, examination was made to determine possibility of delivery via naturales. There was no dilatation but the os was soft and easily dilatable, especially when drawn down and index fingers of both hands employed. I had some difficulty in rupturing the membranes, but once through these, easily secured both feet, performed version and rapid extraction was accomplished, the after-coming head presenting no difficulty. The cord was cut at once, the child was only slightly cyanotic and quickly responded to alternate splashings of hot and cold water. Actual time of manipulation six minutes; actual time from death of mother to birth of child ten minutes. The child was male, weighed five and three-quarter pounds, was oiled, wrapped in cotton wool, was placed on modified milk in two days, and was taken from hospital in excellent condition on the eighth day.

My main object in reporting the above case is to emphasize the possibility of a fœtus living for some time in utero after the death of the mother, even when that death is due to *organic disease*, and incidentally to point out that delivery in such cases via naturales is possible and even easy of accomplishment.

The literature quotes quite extensively cases delivered by Cæsarian section from mothers whose death was due to some accident befalling them while in the midst of otherwise perfect health. These I do not purpose discussing at all, because they stand in a class quite distinct and different from the case I have quoted.

The literature, however, is decidedly scanty and a bit contradictory in regard to the two outstanding features in my case: First, to the continuance of life of fœtus in the uterus of a woman dying from organic disease; and second, the method of delivery of such cases. Many able writers do not mention the subject at all. Others are fairly agreed that delivery should be attempted in all such cases, especially if past the sixth month. Only a few, however, quote personally conducted cases. *Hurst* says, "The child rarely survives the death of the mother more than a few minutes, and usually the death of both is synchronous." He later adds that with the persistence of fœtal heart sounds immediate extraction should be made by Cæsarian section, but better by forced dilatation. He says, "I had one experience in such a case which presented no difficulties and was completed in a few minutes."

Cazeaux and Tarnier say, "That diminished resistance after death has occasionally permitted the delivery of the fœtus to be effected by version or forceps. In fact this is preferable to Cæsarian section if the head is low in the excavation, for extraction through the incision would then be difficult." They cite cases from other authors, but none of their own.

Millot, an Italian obstetrician, gives rather a discouraging picture in his citation of fourteen cases attempted by the natural route and in which only three were delivered alive. His work was done between 1858 and 1878.

Parvin, of Philadelphia, gives the question considerable attention, quoting several authorities, some of them continental men of vast experience, and builds up a fairly strong argument favouring

the advantages of the natural route with forced dilatation or incision of the os, version or forceps, etc.

Reynolds and Newell, of Boston, favour the same method and say that the physician is bound by every consideration to attempt to preserve the child's life by most rapid extraction. The question of the real death of the mother may be present and be sufficient to jeopardize the child's chances. If in doubt, they advise rapid manual dilatation, etc.

DeLee, of Chicago, whose scientific dealings with the subject makes his opinion worthy of note, says, "Since the dying mother takes oxygen from the fœtus, the death of the latter usually occurs first. If the mother dies suddenly the child may live a variable period." He quotes cases from other authorities, but the cases quoted were ones of accidental death and not organic disease.

I have presented my case. I have searched such records as were at my disposal. My conclusions, I believe, can be fairly well taken, namely: First, that the fœtus may continue to live in utero for some time after the death of a mother, dying from organic disease. My case was delivered ten minutes after the mother had died of her first eclamptic convulsion. Second, that the delivery of such cases is practicable by any obstetrician on account of the relaxation of the parts due to death and before the onset of rigour mortis. My case had not had a single pain, was only a little over eight months pregnant, with no dilatation and yet delivery was easily accomplished in about six minutes.

POST-GRADUATE EXTENSION COURSES IN ONTARIO

There has just been published by the Ontario Medical Association, the second schedule of post-graduate extension lecture courses for distribution to the local medical societies in the Province.

The subjects presented embrace the entire field of Medicine as existing to-day, and local groups of practitioners are to be congratulated on having at their disposal a plan whereby they may have brought to their own locality from time to time all that is new and up-to-date in their profession, presented by men well qualified to perform the task.

The success of the undertaking depends entirely upon the interest manifested by local groups and the extent to which the opportunities offered are accepted.

In several centres the plan has already been put into operation with very gratifying results. Every local society should show its appreciation of what has been arranged by making use of the services extended.

Editorial

THE ADMINISTRATION OF ARSPHENAMINE

IN view of the widespread publicity given to recent fatalities following the injection of an arsenical compound, the letter of Dr. J. W. McCullough which appeared in a recent issue of the Journal is most timely.

In this issue appears a retrospect which deals with the toxic reactions which occasionally follow the administration of the Ehrlich preparation and its allied products and their numerous substitutes.

Probably no drug has been so extensively used in recent years as arsphenamine and its allied compounds. As a result of the war, the countries at war with Germany, and in which Salvarsan had been previously patented by Ehrlich, granted a varying number of licenses for the manufacture of the drug. In Great Britain and the United States, the respective governments have formulated standards and established bureaus for the testing of the compounds issued for public sale. It is highly desirable that our Canadian authorities should establish a bureau, whose guarantee should accompany every preparation placed on sale in this country. Such a guarantee, while eminently necessary, does not relieve the physician using arsphenamine or neoarsphenamine, from a serious responsibility. There have been fatalities; though when one considers the inestimable value of the drugs, and the extensive use made of it, these fatalities should not be given undue weight.

Serious toxic reactions frequently follow the use of the drug, even when the best standards of chemical purity are complied with. For these, the physician who prepares the drug is largely, though not entirely, responsible. The drug is usually given by the intravenous route, one whose frequent use should not lead us to disregard its manifest hazards. It is most important therefore that the utmost precautions be taken, and that no carelessness or inexactitude be permitted in the chemical and surgical technique of such a procedure, even if the average dose of the drug administered possesses a large margin of safety.

The preliminary preparation of the patient for intravenous is of value, the dosage and the intervals between doses are to be considered, but the most important factor consists in the actual mixing of the drug and the technique of administration. This point is very fully dealt with in the retrospect previously referred to.

Much work remains to be done in chemical and pharmacological fields, with respect to arsphenamine, and its action in the human body. This applies equally in the clinical field. It is probably true that the average patient receives too little arsphenamine, and the ideal standard of treatment is still being sought for. Even with the invaluable Wassermann test, therapeutists are still groping in the dark, as to the total amount of arsphenamine to be given, and the proper intervals between treatments. In the beginning, and imbued with the glamour

of Ehrlich's *therapia sterilisans magna*, syphilologists were satisfied with two injections of arsphenamine. With the occurrence of relapses, clinical and Wassermann, anti-syphilitic therapy has gradually been intensified and protracted, and as yet no sure resting point has been reached. One cannot, for many reasons, keep on giving weekly intravenous doses of arsphenamine, indefinitely. Our therapy must therefore include mercury, which while less treponemicidal than arsphenamine, and in adequate doses more toxic, is none the less a necessary adjuvant.

The administration of arsphenamine is open to one disadvantage. Its effects on the lesions of syphilis are so rapid and so striking, that the patient, and often the physician, are lulled into a sense of false security. It follows therefore, that the treatment is often inadequate. This inadequacy was exemplified during the war in the treatment of soldiers, when military exigencies demanded the return of the infected soldier to his unit at the earliest possible moment.

Two points should be stressed. First, if arsphenamine is to be given, its use should be safeguarded by all the refinements of chemical and surgical technique, and with a due regard for the dangers of its improper administration. Secondly, and no less important, the treatment should be continued for a sufficient period of time, to forestall all possibilities of a clinical or Wassermann relapse, and cessation of treatment should not take place till an adequate test of cure has been carried out.

A CHANCE FOR MENTALLY DEFECTIVE CHILDREN

THE Special Class, or as it is called in Ontario, the Auxiliary Class, is making its way in Canada. Halifax was one of the first cities to establish such classes. Victoria has had special classes for years and their success is a matter of interest and satisfaction to the community, who recognize the value and importance of the training given to these children, and the consideration and kindness with which they are treated. Vancouver has several teachers engaged in this work. Edmonton, Calgary, Regina, and Winnipeg have all made a beginning and every year the interest in this work grows and the work itself extends. In Ontario, a beginning has been made in Toronto, Ottawa, Hamilton, Brantford, Windsor and Guelph, but progress has not been rapid. A hopeful sign is the conference of Auxiliary Class teachers which was held in 1920 and in 1921 in connection with the Easter Annual meeting of the Ontario Educational Association at Toronto. The good attendance of Auxiliary Class teachers at these two conferences and their energy and enthusiasm as well as their excellent knowledge of Auxiliary Class work speak well for the future of the movement in Ontario.

In Montreal and elsewhere in Quebec, much interest is taken in the subject and with the valuable assistance of the Canadian National Committee on Mental Hygiene there as in other provinces, good work is being done.

To all those who are interested in the care and training of mentally defective Children, the best field of work is the National Schools. That is the place to discover the "Almosts", to find out and

develop their gifts and to give them the best possible training and most suitable opportunities. In connection with our schools too, and especially with the medical inspection of schools, a beginning can be made of that confidential scheme of registration of the mentally-defective which must necessarily be the foundation of any system of adequate and kindly care and control for mentally defective persons,—a control which should protect the mentally defective person and provide for his independent maintenance as far as possible and for his happiness, but which should also protect society from the anti-social acts and tendencies of some mentally defective persons, and above all, should protect posterity from the curse of mental defect.

Correspondence

A NEW METHOD OF APPLYING DRUGS TO THE POSTERIOR URETHRA

To the Editor:

I WISH to describe a method of instillating the posterior urethra which, I think, offers decided advantages over the procedure usually employed.

Instead of the Ultzman or Guyon syringe a posterior urethroscope, either a Swinbourne or Young, is used. The instrument is inserted, the part to be treated brought into view and swabbed clean. The medicament is then dropped into the lumen of the urethroscope, the position of which is such that the fluid will gravitate to the distal end, and the aperture fits so tightly that the drug comes in contact only with the visual field of the urethra. By gently revolving the urethroscope a few degrees to one side and then to the other the drug is brought to play over as large a urethral surface as desired. The fluid is then withdrawn from the urethroscope by means of a thin pipette or a small catheter and the instruments then removed. The advantages of this method are:

1st. The whole treatment is given under direct vision of the eye.

2nd. The drug is applied only to the surface desired, the remainder being protected from unnecessary exposure to the action of strong corrosive drugs.

3rd. By this method the patient can tolerate much stronger applications. For example, silver nitrate 25 per cent., without anything like the usual pain and urgency experienced after the present day method.

4th. The end results are very much better.

Very respectfully yours,

C. J. GROSS, M.D.

Montreal, April 15th, 1921.

NUM PECCAVIMUS? "ACUTE ABDOMEN"

Dear Editor:

I SAW in last number of our Journal,
(Is Journal proper word to use when it is not diurnal?)
That Mr. Cameron says our speech should be both pure and proper.
A shilling, can't be called a "bob". A hat is not a "topper".

Now Mr. Cameron doesn't like the words: "acute abdomen".
They "get his goat" to use a phrase not found in classic Roman.
I'm sure he'd much prefer to use the Anglo-Saxon belly,
No latin in that word is hid, forsooth! it rhymes with jelly.

Please Mr. Cameron! let us have a term that's more expressive,
Than the one that you take umbrage at and flay with words excessive.
Dear Virgil and old Euclid *et proh pudor!—lingua franca!*
Are hurled at him who said, "we sinned," *hinc lacryma illa sancta!*

'Tis said that words were used by Ben and by sweet Avon's Swan,
That in their day did not look good to all the scribbling spawn.
But now of course they're quite O.K., no longer are they slang,
O tempora! O mores! acute abdomen? bang!

M. D.

The Association

THE PROVISIONAL PROGRAMME OF THE FIFTY-SECOND ANNUAL MEETING OF THE CANADIAN MEDICAL ASSOCIATION, HALIFAX, JULY 5th, 6th, 7th, 8th, 1921

GENERAL PROGRAMME

Monday, July 4th.

8.00 p.m.—Meeting of The Council, Halifax Hotel.

Tuesday, July 5th.

9.00 a.m.—Registration.
10.30 a.m.—General Business Session.
3.00 p.m.—Sections in Medicine and Surgery.
8.00 p.m.—Addresses of Welcome and two addresses in Public Health.

Wednesday, July 6th.

11.00 a.m.—Address in Medicine and three papers of general interest.
3.00 p.m.—Sections in Medicine and Surgery.

Thursday, July 7th.

11.00 a.m.—Address in Surgery and three papers of general interest.
3.00 p.m.—Sections in Medicine and Surgery.

Sessions of Public Health Section will be announced in final programme.

ADDRESSES

Address in Medicine. D. L. Richardson, Superintendent, Rhode Island Hospital, Providence, R.I. "The Relation of Infectious Hospitals to Medicine."

Address in Surgery. Hugh Cabot, Ann Arbour, Mich. To be announced.

SECTIONAL PROGRAMME

SURGICAL SECTION

E. W. Archibald, Montreal. "Notes upon recent cerebral work."

George E. Armstrong, Montreal. "Perforating Ulcer of the Stomach and Duodenum."

J. S. McEachern, Calgary. "Actinomycosis of the Abdomen; with Report of Cases."

James C. Masson, Mayo Clinic, Rochester. "Carcinoma of the Stomach."

A. E. Garrow, Montreal. "Difficulties in Diagnosis and Some End-Results following Operation for Cancer of the Breast."

A. J. Hamilton, Boston. "The End-Results of the Various Methods of Treatmen of Surgical Diseases of the Stomach and Duodenum."

W. S. Syme, Glasgow Royal Infirmary, Glasgow, Scotland. "Malignant Diseases of the Throat and some points in Diagnosis and Treatment."

Cornelium G. Coakley, Professor of Laryngology, College of Physicians and Surgeons, New York. "Hæmorrhage during and after Tonsillectomy; Surgical Principles and Methods for its Control."

D. H. Ballon, Montreal. "Tonsil Operations."

W. B. Howell, Montreal. "Some cases of unusual interest to the Anæsthetist."

W. R. MacAusland, Carney Hospital, Boston. "Ankylosis of the Elbow, with Treatment by Arthroplasty; with Illustrations."

Fulton Risden, Toronto. "Surgical Treatment of Deformities of Face and Palate, with Lantern Slides."

D. E. Mundell, Kingston. "End-Results of some War Injuries."

W. G. Turner, Montreal. "Arthritis of Acute Infectious Origin."

E. M. Eberts, Montreal. "Surgical Treatment of Goitre with Special Reference to Cases of Hyperthyroidism and the Application of Basal Metabolic Rate."

D. W. MacKenzie, Montreal. "Some factors in the Ætiology and Diagnosis of Infe tions in the Renal Pelvis and Tubules."

W. W. Chipman, Montreal. "The Septic Uterus and its Treatment."

H. A. Bruce, Toronto. "Hour Glass Stomach."

F. N. G. Starr, Toronto. "Results in the Surgical Treatment of Gall-Bladder Disease."

A. Primrose, Toronto. "Pancreatic Cysts."

W. Gordon M. Byers, Montreal. "The Eye as a Signal of Disease."

F. S. Patch, Montreal. (To be announced.)

Medical Section

R. D. Rudolf, Toronto. "Rational Empiricism."

W. F. Hamilton, Montreal. "Some glimpses into Endocrinology."

I. M. Rabinovitch, Montreal. "Acidosis; Practical Application of its Study to Clinical Medicine and Surgery."

G. Gordon Campbell, Montreal. "Lantern Demonstration of some Skin Diseases."

A. T. Mathers, Winnipeg. "Psychiatry in Relation to General Medicine."

A. Birt, Halifax.—"Eye Symptoms in General Practice."

A. H. Gordon, Montreal. "Some Problems in Intracranial Diagnosis."

A. H. MacCordrick, Montreal. "The Diagnostic Value of Examination of Cerebro-Spinal Fluid."

A. A. Robertson, Montreal. "Encephalitis Lethargica."

R. H. Hardisty, Montreal. "Fractional Gastric Analysis."

G. W. Lougheed and L. M. Murray, Toronto. "Sub-acute Bacterial Endocarditis."

A. G. Nichols, Halifax. "Implantation of Secondary Cancer on the Endocardium of the Right Ventricle."

L. M. Murray, Toronto. "Observations on some of the Common Sounds heard in the vicinity of the Heart."

Wm. E. Preble, Massachusetts General Hospital, Boston. "Diagnosis of Cardiac Conditions."

C. F. Wylde, Montreal. "Embolism of Abdominal Aorta."

F. G. Finley, Montreal. "Cardiac Hypertrophy resulting from Spinal Deformity."

Fenton B. Turck, New York. "Shock and Fatigue, with Pulmonary Changes."

Norman B. Gwyn, Toronto. (a) "Persistent Pulmonary Lesions following Influenza. Lantern Slides." (b) "Massive Collapse of Lungs, Post-operative and Traumatic. Lantern Slides."

John W. Dewis, Massachusetts General Hospital, Boston. "Danger Signs of the Gastro-Intestinal Tract."

A. F. Miller, Kentville, N.S. "Six Years Experience with Induced Pneumothorax, Rœntgenograms, and Remarks on Selected Cases."

Wm. Boyd, Winnipeg. "An Investigation of the Pathological and Clinical Value of Duodenal Tube."

F. A. Lockhart, Montreal. "Uterine Hæmorrhage and its Significance to the General Practitioner."

Public Health

J. G. Fitzgerald, Toronto. "Graduate Training in Public Health in the University of Toronto."

R. St. J. McDonald, Montreal. "Disinfectants and Disinfection."

C. J. Hastings, M.O.H., Toronto. "How can we more Efficiently Control the Communicable Disease."

H. W. Hill, Director Public Health Institute, London, Ont. "Infant Mortality; Lessons from Vital Statistical Studies in London."

T. A. Starkey, Montreal. "On the Spread of Tuberculosis from New Aspects."

J. D. Page, Federal Department of Health, Ottawa. "Immigration Protection."

A. F. Miller, Kentville, N.S. "Institutional Treatment of Tuberculosis; its Limitations."

F. B. Jones, Montreal. "The Chlorination of Small Water Supplies."

Geo. G. Melvin, M.O.H., New Brunswick. "The Abatement of Venereal Diseases."

Chester P. Brown, Quarantine Officer, Port St. John. "Review of a Season's Quarantine Station's Work."

A. G. Morphy, Montreal. "An Appeal for the Epileptics."

C. M. Hincks, Toronto. "Recent Progress in the Mental Hygiene Movement in Canada."

Notes on the Meeting

All scientific meetings will be held in Dalhousie University.

Hotels

Halifax Hotel.

American Plan only, $5.00 to $6.00; $5.00 without bath and $6.00 with bath.

Queen Hotel.

American Plan only, rooms $4.50 to $5.50. $4.50 without running water, $5.00 with running water, $5.50 with bath.

Carleton Hotel.

American Plan only, $4.00 to $5.50. $4.00 without bath. $4.50 with running water, and $5.50 with bath.

Entertainments

There will be an afternoon Garden Party at Government House; an excursion and moonlight concert on the North West Arm; A harbour excursion and hodge-podge on Lawlor's Island. Other teas, receptions, bridges and dances are being planned.

Resolution adopted at Vancouver meeting, on the presentation of report from Colonel Bruce's Committee, published below:

"Moved by Dr. Mullin, seconded by Dr. Rankin, that Dr. Bruce's report be referred back to the Committee, and that no further action be taken before being again submitted to the Association; furthermore, that the present report, together with such comment as may be available, be printed in the Journal of the Association."

REPORT OF THE COMMITTEE ON THE RE-ORGANIZATION OF PERMANENT CANADIAN ARMY MEDICAL CORPS

PRESENTED AT THE ANNUAL MEETING OF THE CANADIAN MEDICAL ASSOCIATION, JUNE, 1920

AS the outcome of a resolution unanimously adopted at the meeting of the Canadian Medical Association in Quebec in June, 1919, the following committee was appointed to formulate suggestions based upon their experience in the recent war, having in view the greatest possible efficiency in the Canadian Army Medical Service of the future:

ONTARIO.

Col. Herbert A. Bruce, Chairman, Professor of Surgery, University of Toronto.

Brig.-Gen. A. E. Ross, Kingston.

Col. F. W. Marlow, Professor of Gynæcology, University of Toronto.

Col. J. D. Courtney, Ottawa.

Col. W. B. Hendry, appointed by Faculty of Medicine, University of Toronto.

Lt.-Col. C. L. Starr, Professor of Surgery, University of Toronto.

Major Geo. C. Hale, appointed by Faculty of Medicine, Western University, London.

Lt.-Col. W. T. Connell, appointed by Faculty of Medicine, Queen's University, Kingston.

QUEBEC.

Col. Geo. E. Armstrong, Professor of Surgery, McGill University, Montreal.

Col. Chas. Peters, Montreal.

Col. J. A. Hutchison, appointed by Faculty of Medicine, McGill University, Montreal.

Professor S. E. Grondin, appointed by Laval University, Medical Faculty, Quebec.

Major Harry Morrell, Quebec.

NOVA SCOTIA.

Col. E. V. Hogan, Professor of Surgery, Dalhousie University, Halifax.

Col. John Stewart, appointed by Faculty of Medicine, Dalhousie University, Halifax.

Lt.-Col. J. Hayes, Halifax.

Dr. J. W. Smith, President of Nova Scotia Medical Association, Liverpool.

NEW BRUNSWICK.

Dr. J. S. Bentley, President of New Brunswick Medical Association, St. John.

MANITOBA.

Col. S. W. Prowse, Winnipeg.

Col. R. M. Simpson, Winnipeg.

Lt.-Col. Chas. Hunter, Winnipeg.

Dr. D. G. Ross, President of Manitoba Medical Association, Selkirk.

ALBERTA.

Lt.-Col. F. H. Mewburn, Calgary.

Lt.-Col. Allan C. Rankin, appointed by Faculty of Medicine, University of Alberta, Edmonton.

Dr. D. G. Revell, President of Alberta Medical Association, Edmonton.

SASKATCHEWAN.

Lt.-Col. A. E. Munroe, Saskatoon.

Lt.-Col. T. M. Leask, Moose Jaw, Sask.

BRITISH COLUMBIA.

Dr. Robt. E. McKechnie, President of Canadian Medical Association, Vancouver.

Col. F. C. McTavish, Vancouver.

Lt.-Col. H. C. Ridewood, Victoria.

Dr. I. Glen Campbell, President of British Columbia Medical Association, Vancouver.

It will be seen from the above that the Committee is thoroughly representative of the medical profession in Canada. Care was taken to select men who had had the most varied and extensive experience, both in professional and administrative work in every branch of the medical service in the recent war, and who would therefore have first-hand knowledge of the necessities of a military medical service.

Interchange of ideas has taken place by correspondence and after several months of work the

accompanying suggestions have been unanimously agreed upon to act as a basis for the establishment of our Permanent Army Medical Corps of the future, and which, if followed, it is believed will be greatly to the advantage of this organization.

We feel that the country should benefit from our mistakes as well as our successes in the recent war and that the Government will be well advised if it takes advantage of the voluntary work of the members of this Committee, who have no other object in view but the patriotic desire to see the Canadian Medical Service one of the most efficient in the world.

All of which is respectfully submitted in the hope that it will meet with the earnest consideration of the Government and an early reorganization of this, the most important arm of our forces.

---

1. The head of the Canadian Army Medical Service shall be known as "The Surgeon-General".

2. "The Surgeon-General" shall have executive authority with a seat on the Militia Council and be directly responsible to the Minister of Militia.

3. In the Event of War:
   (a) "The Surgeon General" shall remain at Militia Headquarters, Ottawa.
   (b) A director of the medical services of the army in the field shall be appointed and stationed at the general headquarters of the force.

4. The duties of the Permanent Army Medical Corps shall be administrative only, except during peace time for station hospitals.

5. A Board of Consultants shall be established, composed of Medical Practitioners of outstanding ability and reputation in all special departments, who shall organize, direct and control all professional matters, including the allocation of the medical duties of the officer selected for service. The decisions of the Board shall be final, except for stated reasons of an administrative character satisfactory to the Board of Consultants.

6. This Board of Consultants should be appointed and assume their duties forthwith.

7. The first duty of this Board shall be to formulate a general scheme of preparedness of the medical services.

8. The nursing service shall be auxiliary to and under the control of the Army Medical Corps. The allocation to duty of nursing sisters shall be under the control of the Consulting Board.

9. A course in Military Medicine should be inaugurated in each Medical College in Canada. This course will include such subjects as Medical History of recent wars; Military Sanitation and Hygiene; Military Surgery; Military Medicine; Military Medical Administration and Organization.

10. The Dominion Government should be asked to provide scholarships in all Canadian Medical Faculties for the encouragement of advances in Military Medical Science.

11. A separate competitive examination should be conducted by the Royal Canadian Army Medical Corps for graduates in medicine applying for admission into the Corps.

12. Successful candidates should be considered on probation for a period of one year while serving in the Corps.

13. At the expiration of their probationary year and before they are taken into the service permanently, they be required to take a course of at least six months' duration in the Royal Army Medical College or some other institution approved by the Military Council.

14. That the Dominion Government make the necessary arrangements with the British Government for the course referred to in the preceding clause, until such time as facilities for such training are available in Canada.

H. A. Bruce,
Chairman.

CRITICAL COMMENTS UPON THE FOREGOING REPORT PRESENTED BY ALLAN RANKIN, M.D.

Commenting seriatim upon the fourteen points of the plan as so far submitted:

Para. 1. Without any conceivable compensating advantages, it is proposed to revert from modern British practice to the use of a title which is reminiscent only of the old days when the Medical Service was without substantive rank or anything approaching adequate recognotion, and existed really not as a military service at all. The retention of the designation by the American Medical Service is no precedent for a service which some time ago abandoned its use. Substantive rank and military titles were given to the Medical Service in British Armies in recognition not only of professional capacity but of the military skill and training shown by the service in applying professional

knowledge to the needs of Armies in the Field. The title Surgeon-General, like that of Director-General, is not one indicating rank but only appointment. Furthermore, all the administrative branches of an army: Engineering, Pay, Training, Supply and Transport, etc., are controlled by Directors or Directors-General, with Deputy Directors and Assistant Directors in descending scale, according to the size of the formation with which they are serving. Why should one of the most important administrative services of the army, the Medical, be denied the right to homologate its designations with those of the other administrative branches, as is now authorized? The proposal is only retrograde, with no compensating advantage.

Para. 2. The words "executive authority with" appear unnecessary because heads of administrative services and departments already have executive authority and this bears no relation to a seat on the Militia Council. The importance of the Medical Service in war or in preparation for war may possibly justify the inclusion of the Director-General of Medical Services on the Militia Council. There are advantages in the proposal but there are, also, distinct advantages in having the Director-General of Medical Services responsible to the Adjutant-General, as now.

Para 3. (a) In the event of war.

It is inadvisable to hamper the work of the Director-General of Medical Services in the time of war by such a clause. His whereabouts may safely be left to the Militia Council or to the War Committee of the Cabinet. It is conceivable that, in the event of the despatch of an expeditionary force or in the event of mobilization on a frontier of Canada, the Director-General of Medical Services might, with advantage, proceed with such a force if the organization in the field was considered of greater importance than the organization of reinforcements.

(b) This paragraph is quite ambiguous, bearing in mind the late war with respect to the term "Army in the Field". A Director of Medical Services, overseas forces, or a Director-General of Medical Services, expeditionary force, should be senior to and have jurisdiction over a Director of Medical Services of an army ("D.M.S. Army"). The Royal Army Medical Corps precedent seems safe to follow, especially if Canadian forces are to continue to form part of the armies of the Empire.

Para. 4. The term "administrative" is ambiguous. It seems improbable that the best type of medical men are likely to be attracted to the Permanent Medical Service if they are to be restricted to what is loosely termed "administration." An Army Medical Service can be efficient only if it is efficient both in the medical and the military sense. Self-respect, as members of a military organization, requires a knowledge of military customs and procedure which will enable officers and other ranks to meet their fellows of other services on equal terms as regards soldiership. "Esprit de Corps" is otherwise impossible. On the other hand, adequate professional training is equally essential if the efficiency of the Medical Service is to be such as to enable them to retain the respect of other branches of the service in the discharge of their special duties. The greater part of the duties of consulting physicians and surgeons in the late war could, probably, be termed administrative, insofar as their duties were concerned with categorization and classification for disposal. It is a notorious fact that certain physicians and surgeons of unqualified skill and ability as regards civil practice were so intolerant to discipline and regulations (comprehensibly described by them as "red tape") as to be relatively useless. On the other hand, it is beyond question that certain men of good professional standing in civil life were able to combine administrative and professional functions to great advantage. It may, in fact, be stated, that, as a rule, the smart, well trained physician or surgeon, active in mind and in body, will prove to be a useful commanding officer in a military sense in direct proportion to his efficiency professionally. Two definite inducements are necessary for the attracting of the best type of medical men into the medical service: (a) adequate remuneration; and (b) an opportunity for interesting professional work. This can be obtained within the service in a service of such size and variety as the Royal Army Medical Corps but, in a diminutive service like the Canadian, this is possibly only by periods of study leave or of exchange of duties with the Royal Canadian Army Medical Corps. It follows, therefore, that instead of limiting the duties of the Royal Canadian Army Medical Corps, as proposed in para. 4 by Dr. Bruce, the force should be so increased that it might have a wider experience in the public service generally, whether the Naval, Public Health, Northwest Mounted Police, Indian Service, Quarantine or Immi-

gration, as an army in the field has to deal with all branches of medical science. It should be remembered always that a great deal of the advance in the science of medicine in the British Empire has been due to the work of the Royal Army Medical Corps and the Indian Medical Service. Tropical medicine, in particular, has been furthered more by the British Medical Service than by any other scientific body in the world, the result of the widely varying character of the stations in which they have been on duty. One need mention only the names of Leishman, Ross, Rogers, Stevens, Wright, Wenyon, Balfour, and Bruce. It is further noteworthy that not a few of the directors of the medical service of the British Armies in the field were men who had shown outstanding professional ability as surgeons, physicians, pathologists or specialists of one kind or another.

Para. 5. Board of Consultants:

During the war, both overseas and in Canada boards of consultants existed everywhere, selected primarily for their professional standing, and charged with duties in connection not with the personnel of the Army Medical Service but with patients in hospitals. The duties proposed for them in the report involve the introduction of dual authority in its most pernicious form. The absolute necessity of single control was so emphasized from time to time in the late war that comment seems unnecessary. If a director of an administrative service fails or falls short of requirements, he can be superseded in a few minutes by means of a telegram. The usefulness of an Advisory Board is not necessarily, in any respect, impaired by confining its functions to the making of recommendations and in any event the recommendations of consultants' boards, with regard to the disposal of patients or the relative efficiency of the work done in hospitals by individual medical officers is practically administrative action, their recommendations being considered final, both by the O.C., the Hospital in which they may be for the time carrying out their duties and by the Director-General of Medical Services, under whom they work. As a result of war experience, certain changes in the regulations for the Canadian Medical Service have already been authorized which will place, immediately, at the disposal of the G. O. C. of the District, on the request of his medical authorities, the services of specialists or consultants at any place where permanent troops are in garrison in Canada.

Para. 6. See comments on Para. 5.

Para. 7. The heading of the whole scheme makes reference to the organization of the "R.C.A.M.C." (Permanent Corps). This paragraph would appear to include as well the Medical Units of the Canadian Militia. It would clarify the paragraph if it were more explicit. A further obvious comment upon it is that a Board of Consultants who would undoubtedly be men of high professional standing but with little or no military knowledge or appreciation either of the organization of the Medical Service or of its interrelationships with the other services in an army could hardly be considered qualified by themselves to formulate the general scheme of preparedness for the Medical Services. It seems to be an outstanding feature of the proposals in the report that attention has been concentrated on the work of the distributing zone. One wonders especially how a Board of Consultants selected as suggested in paragraph 5 is to obtain the knowledge requisite for the direction of medical work in the collecting zone and the evacuating zone.

Para. 8. Nursing Service.

It is not understood why the Nursing Service should not be part of the Army Medical Corps rather than auxiliary to it. It has always been under the control of the Army Medical Corps. The allocation of nursing sisters to the different medical units in which they are on the establishment is proposed in the report to be done by the Consulting Board, surely a very cumbersome method. It is not in the least likely that the judgments of the various members of a Consulting Board could be co-ordinated to secure better results than are arrived at by having a disposition made by the Matron-in-Chief, whose decisions are based on information furnished by her own observation and by confidential reports, modified by the changing conditions, usually characterized as exigencies of the service. Confusion of thought is again evident in this paragraph, as between the assignment to duty of the nursing sisters on the permanent establishment and those who would be mobilized for duty in the event of war from the nursing reservice, C.A.M.C.

Para. 9. Concurred in, subject to adequate military control by the District Military Authority of instruction with regard to military medical administration and organization. Such training, if undertaken, should be given only to undergraduates in their final years who have been required to acquire a military training through

the medium of the C.O.T.C. The existence of such a military organization in any university should be regarded as a necessary condition for the further specialist training of prospective officers for the Medical, Engineering, and other such technical services.

Para. 10. Concurred in subject to the consideration that educational matters are by law in the hands of the Province which makes the question one of policy for the Privy Council of Canada.

Para. 11. Competitive examinations for entrance on the Permanent Medical Service of Canada, as is the rule with the Royal Army Medical Corps, were instituted by Militia Order No. 281, of June 2, 1911, and examinations were held accordingly in Medicine, Surgery and Hygiene, one paper on each subject. Keeping in mind the recommendation in Paragraph 4, it should be said more explicitly what requirements should furnish a basis for the competitive examination recommended in Paragraph 11. Is this examination to be in administration? If it is to embrace professional work, how can it be conducted by the Royal Canadian Army Medical Corps if their duties are to be administrative only? It is felt that with a service so small as the R.C.A.M.C., the professional qualifications of candidates might very well be accepted as vouched for by the University granting them their degree in medicine. Subsequent promotion should involve additional professional and administrative examinations taken after periods of study leave.

Para. 12. Probation.

Para. 182. King's Regulations and Orders for Canadian Militia states, "All appointments to the permanent staff and permanent force shall be on probation for three years."

Para. 13. Co-operation with the Royal Army Medical Corps and the War Office.

It has been the custom for years that officers of the Permanent Army Medical Corps should take courses in the R.A.M. College, Millbank, and other approved institutions. Officers past and present of the permanent corps to the number of eighteen have, in past years, been so trained, and the procedure is well established under regulations subject to the usual financial exigencies imposed by Parliament in its treatment of the annual estimates.

Para. 14. Arrangements with the War Office.

These have been in force for several years and the British authority has never been approached except to receive most cordial assent and co-operation.

Para. 704. King's Regulations and Orders for Canadian Militia states as follows:

> "An Officer of the Permanent Force or Active Militia may, with the approval of the Army Council (British) be permitted to attend a Course at a School of Instruction in England provided that he is qualified for the course and that the Minister considers that he should attend.

Para. 705 extends the above privilege to N.C.O.'s of the permanent force under the conditions laid down for officers.

Abstracts from Current Literature

SURGERY

Ankylosis of the Metacarpo-Phalangeal Joints. Shaw, C. Gordon: *Med. J. of Australia*, Dec. 18th, 1920, Vol. 2, p. 549.

On the lateral and medial aspects of the metacarpo-phalangeal joints, there are thickened portions of the capsule which receive the name of the lateral ligaments. These fibres arise from a definite tubercle and a depression on the posterior part of the lateral aspect of the head of the metacarpal bone and are attached to the anterior part of the lateral aspect of the base of the phalanx. The writer contends that these ligaments are the main causative agent of ankylosis in this joint in uncomplicated cases. He recommends an open operation for the division of the ligaments. Care must be taken that both ligaments are divided. The hand is then put on a "cock-up" splint and the fingers held in a position of flexion. Movement of the fingers is commenced as soon as the reaction passes, which is usually five days. Much depends on the after care of the hand.

The writer has performed the above operation sn several cases with very gratifying results.

G. A. F.

Bone-Setters, Osteopaths, and Physical Therapeutics. BRADFORD, E. H.: *Boston M. and S. J.*, March 17th, 1921, Vol. 184, No. 2.

DR. BRADFORD'S very interesting article is a plea for a more scientific study of physical therapeutics. He points out that homeopathy flourished because of heavy, nauseous, and needless drugging. Christian Science indicates that psychology and a knowledge of the working of subconscious thought is needed in medical practice. In like manner a prevalence of osteopathy and bone-setting may be due to polysurgery, *i.e.*, excessive operation.

Dr. Bradford points out that the surgical profession of the past generation practiced under the belief that a painful joint always needed rest. It is now known that in convalescent joint conditions, there are important exceptions to this rule. Massage and electricity alone will often not suffice, and joint movement and manipulation may become necessary.

Dr. Bradford points out that one seldom, in ordinary motion of a joint, makes use of that joint's free range of motion. A joint which may move within a certain distance without discomfort will suffer strain in some of the particular ligaments if the act of motion is increased over that used. The ligamentous degeneration following prolonged disuse of a joint is pointed out, and its cure by manipulation through a gradually increasing range of movement.

Dr. Bradford cites a number of cases where patients had suffered through lack of properly applied physical therapeutics.

The article makes a very good case for the careful study of physical therapeutics and a plea for a more intelligent appreciation of its undoubted value. J. A. N.

The Action of the Intrinsic Muscles of the Foot and their Treatment by Electricity. SEVICK, G. MURRAY: *Brit. M. J.*, March 12th, 1921.

MOST of the intrinsic muscles of the foot and the long flexors of the toes play important parts that do not seem to have been recorded. The flexors of the toes raise the longitudinal arch of the foot, because when the weight of the body is thrown forward, as the heel leaves the ground in walking, their action is to draw the heel towards the toes, acting as bowstrings across the arch from heel to toe. The flexor brevis digitorum has the strongest arch-raising action. The transverse arch is maintained chiefly by the dorsal interossei, and this is their most important action.

Description is given how to stimulate electrically the intrinsic muscles of the foot, and good results are promised in hallux valgus, flat-foot and metatarsalgias. It is often difficult or impossible to develop the small muscles by voluntary exercises alone. J. A. N.

The Causes of Cerebral Disturbances After the Ligation of the Carotid Artery, and Ligation of Arteries Without Injury to the Intima. (Ueber die Ursache der Hirnstörungen nach Karstisunterbindung und über Arterienunterbindung ohne Schädigung der Intima). PERTHES: *Archiv. fur Klinische Chirurgie*, Sept., 1920, Vol. 114, p. 403.

PROFESSOR PERTHES tells of an operative case in 1909 for spontaneous aneurism of the internal carotid in a woman forty-four years of age. The carotid was ligated and the aneurism excised. Eight hours after the operation the patient developed a mild hemiparesis with aphasia, three hours later the condition grew worse—hemiplegia—and she expired on the sixth day.

The autopsy revealed that the anterior two-thirds of the left cerebrum had commenced to soften: the intracranial parts of the internal carotid and the anterior cerebral artery were thrombosed. The posterior communicating artery was more prominent on the left than on the right side.

Perthes is of the opinion that the trouble arises with the ligature by injuring the intima, which is ultimately the cause of thrombosis or embolism, not only in the case of the carotid arteries but also in limb amputation.

The question arises, is it possible to prevent thrombosis? The writer is of the opinion that one can avoid damage to the intima and so prevent the resulting thrombosis. The method which seems to be the best is by tying the artery with a 1 cm. wide piece of free fascia, the knot being protected by suture. The intima is still further protected by placing a double layer of fascia around the artery which is then tied with a strip of fascia protected by suture.

The cause of cerebral softening after ligation of the carotid is either thrombosis or embolism. If ligation of the artery be accomplished without injury to the intima the results will be satisfactory.

A. B. I.

UROLOGY

Papillomatous Epithelioma of the Kidney Pelvis. McCowan, P. E.: *J.A.M.A.*, Oct., 1920, Vol. 75, No. 18, p. 1191.

The author has collected forty-six cases from foreign and American literature of examples of papillomata of the kidney pelvis, and reports an additional case. This occurred in a woman of fifty-eight, who came for hæmaturia and pyuria. Cystoscopy revealed a papilloma originating within the orifice of the right ureter, which was removed through the cystoscope. The right kidney was shown to be deficient in function and operation was advised for probable tumour. The kidney was removed with two inches of normal ureter. Hæmaturia recurred in three months. Examination again showed a ureteral papilloma which kept on recurring. Complete ureterectomy was then carried out.

Pathological examination showed a dilated pelvis to be lined throughout with a pinkish white, soft and fragile growth, which on close examination was found to consist of villous projections crowded together. The ureter removed later was found to be lined in almost its entire extent by the same growth. The tumour lacked characteristics present in malignant epithelial neoplasms, and was definitely a papillomatous epithelioma.

The growth is rare, judging from cases reported in the literature, though a number were added by surgeons participating in the discussion of the paper. Hæmaturia, painless and intermittent, was the most common symptom. In about half of the cases, extension to the ureter and bladder was present. Nephrectomy is indicated and with it a complete ureterectomy in view of its tendency to be involved. Secondary growths in the bladder may be treated by fulguration.

Eleven of the reported cases showed metastases. It would seem that all cases are potentially malignant.

In the discussion that followed, Dr. Braasch reported that five cases had been observed in the Mayo clinic. The cases fell into two classes; those with and without metastases in the bladder. The majority will have metastases in the bladder. In these cases diagnosis is easier.

Hydronephrosis may occur as the result of an obstructing metastasis in the ureter. There is usually a marked reduction in the function of the kidney involved. Pyelography is most useful and shows usually an irregular partially obliterated outline of the pelvis, together with dilatation of one or more calices.

All those taking part in the discussion were unanimous as regards the necessity of doing a complete ureterectomy when the kidney is removed. F. S. P.

RADIOLOGY

Radium Element Versus Emanation. Soiland, Albert: *Am. J. Rœntgenol.*, Dec., 1920, Vol. 7, p. 612.

A comparison of the use of the element with that of emanation can be made from two angles, viz: the financial and the clinical. Viewed from the financial angle, one either can or cannot afford to invest a sum of money sufficiently large to cover a complete emanation station. If money is plentiful, the investment will be one gram or more of radium in solution. If finances are limited, the investment in radium probably will be considerably under one gram of the insoluble salts, for radium in quantities less than one gram does not lend itself readily for emanation purposes. The results obtained from radium emanation or from radium element are exactly alike if an equal energy of radiation is used.

The following is a comparison of the advantages and disadvantages of the two methods of administration:

Element

Is available in small amounts. Can be used quite extensively and with an investment of from $20,000 to $50,000. Requires less space for operation, but requires a 2 per cent. insurance carriage. Tubes, needles and plaques bearing parent radium must be carefully protected from loss in tissues to avoid over action. Has unvarying output of energy and radiation. Can be obtained in suitable form of applicators to meet any requirements. Dosage easily computed. Technique easily acquired. Results readily duplicated.

Emanation

Requires an investment of $100,000 or over. Sealed in vault, requires no insurance, but expense for quarters greater and cost of skilled help increases overhead expenses. Loss of emanation needles of no monetary significance and limited radiation makes loss in tissues immaterial. Has a distinct time limit of activity and a varying loss of its energy until spent. Can be made up in any form desirable to suit each individual case.

A distinct advantage. Technique is more complicated. Results not so readily duplicated, owing to more work necessary to match applicators.

W. A. W.

MEDICINE

The Relation of Hyperthyroidism to Diabetes Mellitus. FITZ, R.: *Arch. Int. Med.*, March, 1921,-Vol. 27, p. 305.

FITZ reports a series of thirty-nine cases of diabetes complicated by thyroid disease. The series is limited but it is of value in that it shows the effect of thyroid operations in the course of diabetes. The conclusions justified are that diabetes usually follows thyroid disturbance, that non-toxic thyroid disease does not effect diabetes, and that thyroidectomy alone is a valueless therapeutic measure in diabetes. Furthermore, certain patients with toxic thyroid disease and diabetes, improve to a considerable degree after the thyroid symptoms are checked, due no doubt to a change in the rate of metabolism.

E. H. M.

Administration of a Pituitary Extract and Histamine in a Case of Diabetes Insipidus. GIBSON, R. B. and MARTIN, F. T.: *Arch. Int. Med.*, March, 1921, Vol. 27, p. 351.

THESE writers report a case of diabetes insipidus associated with syphilis, but with a normal sella turcica (*x*-ray). They confirm the work of previous observers regarding the antidiuretic action of pituitary extract when given hypodermatically, and also that the gland has little action when given by mouth. In this patient the urine volume was decreased from an average daily output of 15 litres to 5 litres by daily doses of from 2 to 3 c.c. of the posterior lobe extract. Lumbar puncture and antisyphilitic treatment gave no relief.

In view of the statement that histamine is the active principle of the pituitary gland, they gave a single dose of 0·2 m.g. of the drug. There was a drop of the urine output to 12 litres during the day, but further use of the drug was impossible on account of the severe headache and prostration which followed the injection. The type of reaction differed greatly from that seen after the use of pituitary extract, and is an indirect proof that histamine is not the active principle of the pituitary, although the latter may be a body of similar chemical structure.

Full chemical studies of the blood and urine under the different conditions of diuresis make the report one of peculiar interest. D. S. L.

The Effect on Blood Pressure and the Non-Protein Nitrogen in the Blood of Excessive Fluid Intake. MILLER, J. L. and WILLIAMS, J. L.: *Am. J. M. Sc.*, March, 1921, Vol. 161, p. 327.

BY administering excessive quantities of fluid through a Rehfuss tube the authors studied the blood pressure changes in two cases of hypertension and in one of chronic gout. The patients were given 2½ litres of water every three hours from 9 a.m. to 6 p.m. or a total of 10 litres daily. In one of the hypertension cases the systolic pressure rose from 160 to 287 mm. Hg., the diastolic from 108 to 180, the pulse pressure from 55 to 107. That the volume of the blood was probably definitely increased is shown by the pulse-pressure. The second hypertension case showed an increase in systolic pressure from 200 to 242, in diastolic from 104 to 140. The case of gout failed to show a greater increase than 15 mm. in systolic pressure, the fluid being eliminated almost as rapidly as it was taken. The authors conclude that the degree of rise in pressure depends upon the promptness with which the kidneys function in excreting water.

E. H. M.

The White Adrenal Line (SERGENT): **Its Clinical Significance.** KAY, W. E. and BROCK, S.: *Am. J. M. Sc.*, April, 1921, Vol. 161, p. 555.

IN 1917 Sergent described his white adrenal line obtained by stroking of the skin of the upper abdomen, explaining it as being due to a state of hypoadrenia. The authors, from a study of 255 cases, believe that this phenomenon is due to a local vasomotor reflex, resident in the skin, and having no relation to adrenal gland activity. In favour of their contention are the facts that it occurs independently of blood pressure, acute fatigue, or other signs of hypoadrenia; that it frequently occurs in normals and in a variety of diseases unassociated with hypoadrenia; that it reappears in the face of persistent general manifestations of adrenalin subcutaneously administered; and that it has a peculiar association with scarlet fever. It appears that the state of the vasomotor system which allows of its best exhibition is found in young adults of either sex.

E. H. M.

Epinephrin Hypersensitiveness and its Relation to Hyperthyroidism. PEABODY, F. W., STURGIS, C. C., TOMPKINS, E. M. and WEARN, J. T.: *Am. J. M. Sc.*, April, 1921, Vol. 161, p. 508.

THE authors review the two procedures in present day use for the determination of functional hyperactivity of the thyroid gland; that is the measurement of the basal metabolism, and the increase in blood pressure and pulse rate obtained after the injection of epinephrin intramuscularly. There is no doubt of the scientific accuracy of the first procedure, but of the second its exact nature is not known. Probably it is a stimulation of the sympathetic nervous system. Their work shows that while a positive reaction is frequently obtained in cases of hyperthyroidism associated with an increased basal metabolism, a negative reaction may be obtained in similar cases even when their heat production is markedly increased. Further, positive epinephrin reactions were obtained in many psychoneurotics, in about 50 per cent. of patients convalescent from acute infections, in a high percentage of military "effort syndrome" cases, and in about 14 per cent. of apparently healthy young men. Their conclusion is that the reaction should certainly not be regarded as having any specific significance in the diagnosis of hyperthyroidism.

E. H. M.

Nocturnal Polyuria. BARACH, J. H.: *Am. J. M. Sc.*, April, 1921, Vol. 161, p. 551.

IN contra-distinction to the usually accepted explanation of nocturnal polyuria in subacute and chronic nephritis, that is an inability of the part of the kidney to concentrate, Barach advances the idea that it is due to the physiological adjustments in the circulation incidental to sleep. His studies show that these cases have a complete reversal from the normal in the amount of work accomplished by the kidneys during the day and the night periods. It appears to have no relation to heavy evening meals, physical exertion, arterial hypertension, or the horizontal position.

E. H. M.

DERMATOLOGY

The Application of Cutaneous Sensitization to Diseases of the Skin. ENGMAN, M. F. and WANDER, W. G.: *Arch. of Derm. and Syph.*, March, 1921.

RESEARCHES have been made by these authors in regard to the relationship between certain skin diseases and protein sensitization. Amongst the diseases studied were acne, urticaria, erythema multiforme, purpura hæmorrhagica and the large eczema group. The protein products used were obtained from the Arlington Chemical Company, of Yonkers, N.Y., Squibb, and Parke, Davis & Co.

In carrying out the tests, small incisions were made, one-eighth of an inch long, usually on the inside of the forearm. On each incision was placed a drop of decinormal sodium hydrate, and to this was added a minute amount of the protein to be tested. Thirty minutes were allowed for the reaction to appear, but positive reactions often appeared very much sooner. They point out that cleansing of the skin with such antiseptics as alcohol, was found to influence the reaction markedly, unless a long interval was left before application of the test.

Degrees of reaction were found to vary at different times. Also, persons reacting to a protein of a given group of food stuffs, will often react in a lesser degree to the other proteins of that group.

Positive sensitization was found in 79 per cent. of cases of urticaria, 78 per cent. in infantile eczema, 38 per cent. in chronic general eczema. An almost negligible percentage was found in erythema multiforme and purpura hæmorrhagica, but it is admitted that only small numbers of these cases were investigated.

The writers conclude that cutaneous sensitization by dermal methods is of inestimable value in diagnosis and therapeusis of such skin diseases as those referred to.

H. E. M.

News Items

ONTARIO

Re-organization of the Ontario County Medical Association

The practitioners of Ontario County held a re-organization meeting of their Society at the Ontario Hospital, Whitby, on Friday, May 13th. Dr. F. W. Marlow and Dr. T. C. Routley, of Toronto, were present by invitation, and endeavoured to recount to the local Society, some of the activities of the Provincial Association. A resolution was passed requesting affiliation with the Ontario Medical Association, and the following Officers were elected: President, Dr. S. J. Mellow (Port Perry); Vice-President, Dr. J. McClintock (Uxbridge); Secretary-Treasurer, Dr. James Moore (Brooklin).

The meeting was altogether enthusiastic and interesting.

The meetings of the Public Health Association of Canada took place in Toronto during the week of May 16th to 21st. Many special and interesting addresses by well-known authorities have been given, and it is hoped to give a resume of the proceedings in a subsequent issue.

The second issue of the University of Toronto Medical Bulletin contains a useful article on vaccines and a note of warning on the question of hæmoptysis, the one by Dr. Detweiler, the other by Dr. J. H. Elliott, two very timely articles on subjects of very general interest. A detail of special graduate courses is also given.

The examinations in medicine are being conducted in the various Hospitals of Toronto—the Western, St. Michael's, the Children's and the General. The wealth of the material for examination purposes, particularly in the cardio-vascular line, which St. Michael's has offered, has simplified the work for the examiners though it may have appalled the students. The development of the clinic in this Hospital has been one of the features of Toronto's medical development in recent years. Of more than general interest, is the knowledge that now the pathological material of this institution will come under the observation and care of one of the best-known pathologists of Great Britain, Dr. Magner, of Dublin University. The profession is indebted, we believe, to Sir Bertram Windle for his assistance and interest in the matter, and should congratulate St. Michael's College, St. Michael's Hospital and the great religion they represent on the taking of such a progressive step.—N. B. G.

The Huron County Medical Society met at Wingham on May 11th. There was an excellent attendance. In addition to the general business, a demonstration and talk on "The Diagnosis and Treatment of Pernicious Anæmia" was given by Dr. Norman B. Gwyn.

University of Toronto Medical Faculty

The first issue, vol. 1, No. 1, of a medical bulletin published by the Faculty of Medicine of the University of Toronto, printed by the University of Toronto press, appeared recently. It includes a note on special graduate courses which will be given from May 23rd to May 28th, 1921, and an editorial which we reproduce in full, and two excellent practical details from the Department of Pharmacology and the Department of Medicine.

"The Faculty of Medicine is undertaking to fulfil its duty to the profession in the Province as a state institution in a number of ways. It is seriously handicapped in this endeavour by being over-burdened by a large number of under-graduates, there being more students in the last three years than in all the years of any other first-class medical school on this continent. In spite of this fact, the Faculty provides facilities to practitioners to enable them to keep abreast of the progress being made in the various branches of medicine either (1) by attending undergraduate courses by the week or month, or (2) by extension lectures, or (3) by short "refresher" courses in the holidays. Ten or fifteen practitioners avail themselves of the first method every year; over fifty extension

lectures have been delivered before some twenty local Medical Societies; and the Special Graduate Course last Christmas was attended by fifty medical men.

"As many cannot avail themselves of these advantages, this publication is being issued by the Faculty to every practitioner in the Province, calling their attention to the subjects and dates of refresher courses and containing short, pithy articles on recent advances of medicine, written especially for the practitioner.

"The necessity of the practitioner definitely urging his patients to breast-feed their babies is emphasized in the first article, while in the second, a typical history of a case of Auricular Fibrillation, showing the results of rational treatment, is described.

"Attention is drawn to the three Graduate Courses to be held at the end of May of this year, for which application should be made at once, as the number admitted to each course must necessarily be limited. The clinics given at these courses are specially prepared to aid the practitioner in both diagnosis and treatment.

"Members of the profession are urged to consult the list of Extension Lectures issued by the Ontario Medical Association, of which about one hundred are contributed by the Faculty of Medicine, for the purpose of asking their local Medical Society to avail themselves of this opportunity of keeping in touch with recent medical advances.

"The Faculty are anxious to meet the needs of the practising doctor and would therefore appreciate any suggestions that can be made whereby the University can assist him in his every-day work."

BRITISH COLUMBIA

THE recent attempt of the Chiropractors, Drugless healers and Optometrists to secure special legislation for the unrestricted practice of their respective arts was opposed by a committee consisting of representatives of the Council of the College of Physicians and Surgeons of British Columbia, the British Columbia Medical Society and the Vancouver and Victoria Medical Societies. This representative committee of the profession took the view that in addition to their own protection it was obviously their duty to protect the public, and to demand from any cult practising medicine that its members should show some familiarity with the systematized knowledge of the human body in health and disease, or in other words that they should be able to recognize disease when they saw it.

During the revision of the Medical Act, in 1909, the Osteopaths secured recognition but only by conforming to the provisions of the Act and by qualifying in the canonical subjects, as well as in passing examinations in their own peculiar practice.

Such has worked out quite satisfactorily, and the precedent seemed adequate for the present case, satisfying the demands of the profession. Apparently the committee of the legislature which considered the question was of the same opinion, as the following report will show, and be it noted the report was unanimous:

Mr. M. A. Macdonald presented the Second Report of the Select Committee appointed pursuant to Resolution on 9th March, as follows:

LEGISLATIVE COMMITTEE ROOM,

March 29th, 1921.

MR. SPEAKER:

Your Committee appointed to inquire and report in respect to the proposed Drugless Healing Bill, being No. 23, and the proposed Chiropractic Bill, No. 24, beg to submit as its final report the following:—

As on the inquiry into the proposed Optometry Bill, exhaustive evidence was also presented to the Committee, for and against these proposed Bills. The Committee had the views, apparently of the most prominent representatives of the drugless healing art and of the best practitioners in chiropracty, in support of these measures, while the Medical Council, represented by prominent and reputable members of the medical profession, opposed both Bills.

Your Committee have taken great pains to consider with the utmost care the evidence adduced and the representations made, par-

ticularly as a great many estimable citizens have apparently received benefit from the chiropractors. Whether these alleged results are more imaginary than real or whether they have yet been sufficiently tested over a long enough period of time probably remains to be seen.

As in the consideration of the Optometry Bill—so in respect of these two Bills—your Committee had the benefit of the exhaustive report of Mr. Justice Hodgins, referred to in the previous report of this Committee. His report is voluminous and is quite applicable to the principles under consideration.

The general education obtained in Canada through the medical faculties of the Universities is, your Committee believe, well abreast of the times. The course has been gradually enlarged to keep pace with expanding medical knowledge, and research institutions in different parts of the world are engaged in enlarging the boundaries of medical knowledge, with an open mind to new discoveries possessing merit. On the other hand, it is difficult, from the evidence submitted, oral and documentary, to ascertain the educational standards or scientific knowledge of those who profess to find in the practice of chiropracty and drugless healing a cure for a great many, if not all, ills.

From the curriculums before us of several American Institutions, and the statements made, it would appear that the standards required and the length of time required for study vary, and on the whole are not long enough to afford sufficient training. It would appear, too, that these schools are without the necessary equipment. It is therefore not possible to say that the medical attainments of those now asking for a change in the law are sufficiently high.

The question to be decided by the Committee is this: Have the chiropractors and the drugless healers made out a case for an alteration of the present law, so that without hindrance they may be permitted to practise the healing art?

One of the leading Chiropractic Colleges in the United States is the "Palmer Institute". Dr. B. J. Palmer, the head of this institution, in giving evidence in the case of the State *vs.* Jansheski, in December, 1910, when asked whether, when a patient came to a chiropractor, he was asked the history of the case, answered: "No, because it be of no value"; and in answer to why that was so, said: "A person comes to us without telling us what the trouble is; it makes no difference whether a physician has already diagnosed it as insanity, appendicitis, indigestion, or anything they call it. The chiropractor needs to know nothing about that case from a physician's standpoint; it is immaterial, yet he can take that same case, put it down on his benches and analyse that spine just as accurately without knowing those things; in fact, sometimes, I think better. . . . It is not essential the chiropractor should know what the patient said he had, but you can adjust the current for it running into the organ, and the patient is well. That is where chiropractics becomes purely a mechanical proposition, a mechanical and electrical-making circuit proposition in a man."

The definition of this treatment in technical terms was given by McNamara, of the Universal Chiropractic College, Davenport, Iowa. as follows: "The theory sustaining this system presumes that in consequence of displaced vertebra the inter-vertebral foramina (openings) are occluded (closed), through which the spinal nerves pass. . . . In this way the nerves are pinched, and chiropractors assume that such pinching is responsible for 95 per cent. of all diseases. Chiropractic concerns itself with an adjustment of the subluxations, thus removing the pressure on the nerves."

Reducing it to simple language, the chiropractors affect to find traces of practically all diseases in subluxations of the spine, and their treatment is confined to the manipulation of the spine by hand. It is rather a shock to even the superficial knowledge of the layman, to be told that 95 per cent. of all diseases finds a manifestation in the spinal column. The assertion is emphatically disputed by members of the medical profession, and if knowledge, training, and research is necessary to arrive at a conclusion on such a question then certainly the medical fraternity are better able to give an opinion than the followers of these cults.

One of the chiropractors examined claimed to have cured such a wide variety of diseases as chronic colitis, kidney stone, dropsy, chronic biliousness, rheumatism, chronic ulcer, ulcerated stomach, tubercular spine, rickets, etc. These diseases, they say, manifest themselves by a displacement of the spine. The spread of disease by germs would appear to be of secondary consideration. In fact, one chiropractor stated that, granted the lung was normal, one could swallow tubercular germs by the million and never take the disease. The same witness,

speaking of kidney stone, averred that a man's vertebra must show a subluxation, otherwise he would not have a stone in the kidney.

It would seem apparent that the health and safety of the public is involved in the indiscriminate application of theories such as these to the cure of disease. Public safety is indebted to medical science for the prevention of the spread of contagious diseases; for sanitary regulations and hygienic precautions, the failure to observe which would be disastrous. The standard of knowledge must be maintained at a high point and there must be some recognized body who from training and experience are competent to fix these standards. That recognized body hitherto has been the Medical Council, and your Committee can see no reason from the evidence adduced why it should not continue to exercise these functions in the future.

The fundamental requirement in the treatment of disease is ability to make a diagnosis. It is essential to first know what the trouble is before attempting to cure it. That involves a knowledge of and study of certain standard subjects. Your Committee do not believe for a moment, from the evidence, that the only diagnosis necessary is to feel for certain alleged displacements in the spinal column.

We concur with the statement of Mr. Justice Hodgins, whose investigations occupied many months, involving personal examination of these chiropractic institutions, that: "I cannot bring myself to the point of accepting, as part of our legalized medical provision for the sick, a system which denies the need of diagnosis, refers 95 per cent. of disease to one and the same cause, and turns its back resolutely upon all modern medical scientific methods as being founded on nothing, and unworthy even to be discussed."

Your committee do not doubt that beneficial results have been obtained from the treatment of chiropractors. They have no reason to doubt the word of estimable people who say so. It must be borne in mind, however, that the most of these are chronic cases, and it sometimes happens that by the power of suggestion good results are obtained, particularly in neurotic cases. The Committee were given instances of marvellous cures of shell shock cases during the war as a result of mental suggestion. No doubt new discoveries have been made, and will continue to be made, in medical science; but it is hardly likely that any discovery will enable us to safely dispense with the elementary requirement of diagnosis in the treatment of diseases, and to diagnose it is necessary to have a wider knowledge of the anatomy and of fundamental subjects than simply a certain familiarity with the spinal column.

The chiropractors object to the Drugless Healers Bill, and the latter object to the proposed legislation of the former on the ground that their Bill is all-inclusive. It is sufficient to say, in reference to the Drugless Healing Bill, that the various branches of study pursued by them are simply special courses which are recognized in medical work. This is true of all the branches of treatment referred to in this Bill, except chiropracty. These different types of treatment are carried on by the drugless healers at present really as laymen without sufficient qualifications for the work. They should qualify under the "Medical Act", and then if they so desire specialize in these particular branches.

Notwithstanding the foregoing views, the Committee do not feel that chiropractors or drugless healers should be prevented from practising. We only say that they should first be qualified. They should, before being permitted to practise within the Province, pass an examination satisfactory to the Medical Council, on the following primary subjects: Anatomy, physiology, chemistry, toxicology, pathology, bacteriology, histology, neurology, physical diagnosis, obstetrics, gynecology, minor surgery, hygiene, and the principles and practice of chiropractic. Before taking this examination they should be graduates of a recognized school or college of chiropractic which at least teaches a residence course of three years of six months each year.

The Medical Council in prescribing examinations for applicants for registration as chiropractors should appoint at least one of their number to set the examination in the principles and practice of chiropractic. After passing the examination outlined above they should be registered as a member of the college.

The suggestion that chiropractors would be discriminated against in examinations is not based on fact, as the method of conducting examinations by the Council, by number rather than by name, makes this impossible.

Your Committee therefore recommends that the "Medical Act" be amended to include these provisions. It would be a guarantee to the public that all practitioners were qualified practitioners—a most desirable thing. The chiropractors would prefer to set their own standards

and have a Statute providing for a governing body of its own. This would not be safe, or in the public interest. They are doing medical work, curing or attempting to cure disease. It is the accredited representatives of the medical profession—if they are honest and fair, and there has been no suggestion to the contrary—who are best fitted to prescribe the necessary standards.

This report represents the unanimous views of the Committee.

We submit the evidence herewith.

M. A. MACDONALD,
Chairman.

Resolved, That the House, at its rising, do stand adjourned until 2 o'clock p.m. to-day.

And then the House adjourned at 12.45 a.m.

A. M. MANSON,
Speaker.

Book Reviews

INFECTIOUS DISEASES. A Practical Text Book. By C. B. KER, M.D., (ED.,) F.R.C.P. (ED.,) Medical Superintendent, City Hospital, Edinburgh, 627 pages, 32 full page plates, including 5 colour photographs and 7 colour plates, 68 charts. Price, $12.00. London, Oxford Medical Publications. Toronto, McAinsh & Co., Limited, 1920.

The first edition of this book appeared in 1909. A second edition was called for in 1914 and almost completed when the war intervened. Appearing now, the second edition has many alterations and additions necessitated by the large amount of work done on the infectious diseases during the past ten years. The diseases dealt with are: Measles, Rubella, Scarlet Fever, Smallpox, Vaccinia, Chickenpox, Typhus Fever, Enteric Fever, Diphtheria, Erysipelas, Whooping Cough, Mumps and Cerebro-Spinal Meningitis There is a splendid chapter on fever hospital problems in which the author writes fully from his own wide experience and discusses such pertinent questions as cross infections and their solution. The experience of other hospital directors also finds a place here.

The book is a valuable monograph on the diseases with which it deals, giving as it does the writer's own observations and dealing only with those diseases which come into his own field. The Schick reaction and other new and important work on infectious diseases find a place and are impartially discussed.

It should be welcomed by all public health departments and hospitals, and the general practitioner will find it a storehouse of information.

It is well written and fully up to the standard of the best of the Oxford Medical publications.

J. H. E.

EXOPHTHALMIC GOITER AND ITS NONSURGICAL TREATMENT. By ISRAEL BRAM, M.D., Instructor in Clinical Medicine; Jefferson Medical College, Philadelphia. 438 pages. Price, $6.50. St. Louis, C. V. Mosby Company, Toronto, McAinsh & Co., Limited, 1920.

In the earlier chapters of this book, the author deals with the anatomy and physiology of the thyroid gland, the pathology pathogenesis, symptomatology, diagnosis and differential diagnosis of Graves' disease; other chapters deal with diagnostic tests, the course and prognosis of the disease. Having dealt very fully with these features to which some 200 pages are devoted, he then passes on to the subject of nonsurgical treatment. He says, "I consider exophthalmic goiter a morbid process belonging strictly to the realm of the internist. Surgery in the usual, ordinary, everyday case of exophthalmic goiter is a fallacious procedure." His discussion which leads up to this opinion is illuminating and he quotes many authorities, surgical and medical to support this contention. He details in full the methods he feels should be applied in treatment and gives the results of a number of years experience. Among his conclusions we read, "Careful nonsurgical management, then, is capable of completely and permanently curing nearly every case of hyperthyroidism. The occasional exception not responding to nonsurgical measure is not an instance of genuine Graves' disease, but is one of malignant de-

generation of the thyroid gland, a case of toxic symptoms superimposed upon a long-standing nontoxic goiter, or a case brought to the clinician's attention in a moribund condition. The author, in unison with others interested in thyroid therapy, does not hesitate to conclude that he has been able to cure every case of Graves' disease that was able to come to his office; this was accomplished in from six months to two years, depending upon the exigencies of the case treated."

The first portion of the book is an excellent monograph on the subject of exophthalmic goiter, and the latter part a strong presentation of the author's views upon treatment. J.H.E.

FRACTURED FEMURS. By M. G. PEARSON, O. B.E., M.B., R.Sc., F.R.C.S., Brevet Lieut-Colonel South African Medical Corps, and J. DRUMMOND, M.D., M.R.C.P., Captain South African Medical Corps. 92 pages, 50 illustrations. Price, $3.50. London, Oxford Medical Publications. Toronto, McAinsh & Co., Limited.

This little work presents an excellent and comprehensive description of the methods evolved by the authors in the treatment of fractured femurs at special femur hospitals both in France and in England.

These methods may be briefly summarized as to essentials into:

1. The use of the "Thomas" splint, with the addition of hinged bars for the support of the leg from knee down.
2. Extension by calipers applied to the femur slightly above the condyles.
3. Early mobilization of the knee.
4. Suspension of the ring of the splint to prevent it slipping upward past the Tuber Ischii.
5. The use of a sectional bed of special construction.

The reasons for these various points being insisted on, are given in clear crisp language, as are the descriptions of the various details concerned in carrying out the methods.

The results achieved are in themselves quite sufficient evidence as to the surgical soundness of the methods described, and when one considers that a large proportion of the cases were of the compound comminuted type the end-results must be described as most gratifying.

The contents of this volume warrant for it a very wide circulation and it should be read and studied not only by every hospital surgeon, but also by every practitioner of medicine, who may at any time be called upon to treat a fractured femur. E. R. S.

AN EPITOME OF HYDROTHERAPY. For Physicians, Architects and Nurses. By SIMON BARUCH, M.D., LL.D., consulting physician to Knickerbocker and Montefiori Hospitals. 205 pages with illustrations. Price, $2.00. Publishers: W. E. Saunders Company, Philadelphia and London, 1920.

EPITOMES are not always to be commended. This epitome is not only well written and its facts clearly stated, but it is also well illustrated. The author is well known as an enthusiastic advocate of hydrotherapy, a method of treatment to which he has devoted the better half of his professional career now extending over the half century. In the present small volume not only are exact directions given as to the technique of procedure to be followed in the various baths, packs and compresses but also many causes of failure are pointed out which by more careful technique could be avoided. We are ourselves convinced of the value of hydrotherapy when properly applied and after reading over carefully this small volume can recommend it as an excellent guide to an important method of treatment.

A. D. B.

PUBLIC HEALTH AND INSURANCE. BY SIR ARTHUR NEWSHOLME, Lecturer on Public Health Administration at the School of Hygiene and Public Health, Johns Hopkins University, Baltimore. Cloth, 8 volumes. Johns Hopkins Press, Baltimore, Md.

This collection of addresses, made by Sir Arthur Newsholme in America from Toronto to New Orleans, and from New York to California, embraces a wide range of the very livest subjects now before the medical profession. They relate largely to his studies as Medical Officer of the Local Government Board, England. His lecture (III) on the increasing socialization of medicine, and that (VI) on the Inter-relation of various social efforts, dealing though they do with English developments, bear very directly on the problems facing Canada and the Canadian medical profession with its allied groups, Dentistry, Nursing, Public Health. Hospitalization has increased in England and Wales so that where 11 per cent. of deaths occurred in public insti-

tutions in 1881, 20 per cent. occurred therein in 1910; while in London, Eng., these deaths increased from 20 per cent. in 1881 to 40 per cent. in 1910. About one in four of the total population of London, Eng., received free medical aid in voluntary institutions in 1908. Of 24,000 medical practitioners in England and Wales, 5,000 are poor-law doctors, about the same number are in the Public Health service. Sir Arthur estimates that three-fourths of the British Medical Profession undertake contract work under the National Insurance Act, which includes about one-third the population of Great Britain, now, and if wives and children were insured under this act also, would include about two-thirds of the total. It applies to all manually employed receiving less than £250 per year. He quotes approvinly Dr. H. S. Beadles, thus—"The medical attendance given under the National Insurance Act . . . is an absolute failure and amounts to little more than first aid, carried on at an enormous cost." Sir Arthur says that the National Insurance Act constituted a great stride in the socialization of medicine, but was made ill-advisedly: and requires that many false steps be retraced, before it can be satisfactory to the public or the profession. He urges from the disastrous British experience that "it is for *Physicians* to guide the course of events" (in the inevitable developments that are coming). We may not all agree with all he says; but certainly this point is obviously true. He believes therapeutic and preventive medicine should be linked up and under central control, and that every medical practitioner should be trained to investigate each case of illness from a preventive as well as from a curative standpoint. This implies an ideal situation truly—and we must all confess that ætiology is perhaps the last subject on which the mind of the "busy practitioner" rests. But how the active therapeutist is to find time for the distractions of such investigations—involving as they do Sherlock Holmes work of the most intricate and time-consuming sort in the majority of cases—Sir Arthur should explain. Only if the therapeutist is on salary and moreover is limited to a given number of treatment cases per day could be begin to follow, satisfactorily, the trails of the ordinary infections. Moreover, the therapeutic mind and the ætiological mind are of two distinct types—as distinct as those of the clergyman and the crime-detective in other fields. We have no quarrel with training the practitioner in such work, as we have no quarrel with training the clinician in laboratory work. But in practice, times must change indeed before the clinical man can find time or opportunity to make for himself the diphtheria, tuberculosis, typhoid or Wassermann tests he may require in dealing therapeutically with his patients; and even move before he can thread out the routes of infection by which his patient with a hæmorrhage became infected with tuberculosis or his diphtheria patient came to need the antitoxin or the intubation which the clinical man must furnish.

Clear-cut discussion of many problems cognate to the main one—including an excellent review of the present status of tuberculosis from the ætiological, social and preventive standpoints—make this set of lectures one that every physician should read if he desires to become posted on the great medical question of to-day—which is "Quo vadis?" H. W. H.

MEDICINE FOR NURSES. By JOHN HENDERSON, M.D., Ch.B., F.R.F.P., S.G., Visiting physician, Glasgow Royal Infirmary, Professor of Medicine at St. Mungo's College, Glasgow, Lecturer-Examiner in Clinical Medicine, Glasgow University, Lecturer and Examiner in Medical Nursing, Glasgow Royal Infirmary, pp. 263. London, Edward Arnold, 1921. Price 8/6 net.

The reviewer's first impression is favourable, the text being well written and free from errors in typography and English as is the case in most English books. The plan of the book is excellent and is arranged to provide a nurse with that information concerning disease which will secure more intelligent co-operation in the treatment of the patient. For a practical book, however, it is strikingly lacking in details. For example, the use of Mustard and Linseed poultices is mentioned but no directions for their preparation are to be found. Again under pediculi it is stated that "all nits are to be removed" yet no hints are given as to how this may best be accomplished. Under Ringworm the nurse is told "every precaution must be taken to prevent its spread to other parts, and to other people," and no instructions how this is to be done. For Migraine "any possible source of irritation is to be removed", and no suggestion what is to be sought as a cause. Under Broncho-pneumonia and Pneumonia the nurse is told that cardiac failure is to be guarded against, and directions

are given for the treatment of heart failure, but the nurse is not told what signs or symptoms she must watch for, and this is surely more important than the treatment which is the field of the physician.

The nursing of the tuberculous is not well written, is wholly inadequate and lacks essential detail. For relief of cough only medicines are suggested, the usual non-drug treatment which falls within the nurse's sphere being quite ignored. The author's valueless generalization and lack of detail leads him to write "For early cases a cold dry climate is most beneficial, as that of Davos or Canada" which is a fair example of many such worthless statements. The paragraph dealing with Diabetes does not give a fair representation of the accepted treatment of to-day.

If the author would rewrite the nursing instructions with some attention to details he would have a book of some value to nurses, otherwise delete all such paragraphs and leave the book as a nurses' compend of diseases with an outline of general treatment. J. H. E.

The advent of the *American Journal of Hygiene* is extremely welcome. It meets a long felt want on this continent, for hitherto there has been no journal devoted specially to matters of Hygienic interest,—and for a good few years the amount as well as the quality of research work done on this continent has been such as to warrant such a journal.

One feels quite sure, that in the hands of Dr. Welch and his board of able assistant editors the journal will not only be assured of a great welcome but that implicit reliance may be placed upon the good quality or high standard of work handled by it.

The present articles form a good augury of the future. They show that the standard aimed at is high,—and one cannot fail to be impressed by the vast amount of painstaking and accurate work connected with these papers.

They are all connected with Hygienic matters of great importance and without wishing in any way to make distinctions the researches on Yellow Fever by Noguchi are particularly valuable, for the evidence he brings forward seems fairly conclusive that he has found the organism answerable for the disease.

The further issues of the Journal will, I am sure, be looked forward to with great eagerness by all interested in Hygienic matters. T.A.S.

SIX PAPERS BY LORD LISTER, with a short biography and explanatory notes by SIR RICKMAN J. GODLEE, BART., K.C.V.O., M.S., Surgeon in Ordinary to H.M. The King, etc., etc. With four plates and an autograph letter. London: John Bale, Sons and Danielson, Ltd. Ten shillings net.

Two years ago we reviewed in these columns the life of Lord Lister, by Sir R. J. Godlee, and we are sure that all who have read this book will be glad to know of another by the same gifted author, in which they may study Lister's work in his own words, in a series of selections from his Collected Works. This work has just been published and is the first to appear of a new series of Medical Classics.

It was no easy matter to make a suitable selection, a selection which should exhibit the quality and range of his studies, and give an idea of the great labour and sheer genius displayed in his researches, but we may say at once that the selection is admirable.

The first is from the paper on the Early Stages of Inflammation, being the fourth section of this remarkable contribution to science, read before the Royal Society in 1857, when Lister was thirty years of age. This paper shows him as an investigator in physiology, making original observations and deducing new laws. We learn something of his intense application, his ingenious hypotheses, his logical arguments, and the inflexible resolution with which the truth seeker submitted every speculation to the arbitrament of experiment. We are also impressed by the ingenuity with which experiments were designed and the deftness of the manipulations required. A few drawings with which the paper was illustrated, are reproduced.

The second selection is the article on Anæsthetics, which was contributed to Holmes' "System of Surgery", in 1861. This paper is a good illustration of the philosophical way in which Lister brought physiology and pathology to support his views on anæsthesia. His researches on this subject are among the labours of Lister which have been ignored or forgotten by surgeons.

The third selection is the epoch-making paper, "On a new method of treating compound fractures, abscesses, etc.," which first appeared in the *Lancet* in 1867. Only one remark need be made on this paper: It is the most important surgical paper ever written. It opened a new era in medical history, and Surgery, no longer hampered and checkmated by a "hidden hand", became

free from the fear of a fickle fate, and "sweet with certainties."

The next contribution appeared in the *Edinburgh Medical Journal*, Vol. xvi, 1875-6, as "Demonstrations of Antiseptic Surgery, before members of the British Medical Association." This was "a stirring and important occasion; the large theatre in the old Royal Infirmary occupied by four or five hundred members, mostly general practitioners, but with a good sprinkling of surgeons, the former with open minds but sceptical, the latter for the most part either simply incredulous, or strongly opposed to Lister and all his works." And yet this was the most brilliant period of Lister's career. Ten years of ceaseless toil in laboratory and hospital ward had proved him right in his application of the Germ Theory and "his reputation was firmly established in Scotland, Scandinavia and Central Europe, but in England his influence was not great far south of the Tweed, and in London it had done little more than ruffle the stagnant pool of old-fashioned surgery." Such demonstrations as these were the daily privilege of students who followed Lister's clinics, and the visitors, for the most part foreign, who came to see for themselves, but it was the first occasion which Lister had had of showing his method of operating and of dressing wounds before so large a gathering.

They saw the carbolic spray, of course, and this seemed to many superficial observers the chief factor in Lister's work, but they heard him say, "If we could dispense with the spray no one would rejoice more than myself," but, with the bacteriological beliefs of that date, the use of the spray was justified. They saw much more than the spray. "Many of the audience saw things they had never seen before." They saw new principles in surgery, and operations done with equanimity and confidence which had never been described in text books. They saw inflamed and tuberculous joints opened freely, ununited fractures treated by open operation and wiring, excision of varicose veins, suture of veins, arteries ligatured in their continuity, for aneruism, or in wounds, with catgut and the ends of the ligatures cut short and buried in the wound. They saw operation wounds of all kinds healing without suppuration, as the rule and not the exception. They saw bloodless operating, and they saw organizing blood-clot.

The fifth paper is a good illustration of Lister's purely scientific investigations, and shows him as a pioneer in the new science of bacteriology.

It is an exposition of Pasteur's work on Fermentation, supplemented and extended by his own on putrefaction, and, incidentally describes the method by which he secures a pure culture of the bacterium lactis. It was the Introductory Address delivered in King's College, London, on October 1st, 1877, when he entered on his duties.

The last paper given is that read at the International Medical Congress in Berlin in 1890. A quarter of a century had passed since he had begun his work on antiseptic surgery. That work was now crowned with success, his principles had been adopted by surgeons all the world over, and Medicine recognized him as one of its greatest masters. Yet the address was largely a tribute to the discoveries and successes of others; he referred to his own work with characteristic modesty, dwelling on his own earlier difficulties and mistakes, and explaining the reasons for changes which had from time to time been made in his practice.

The biographical sketch with which the book opens is a fascinating chapter in which the personality of Lister is revealed perhaps more vividly than in any previous writing. It gives the chief events in his life, gives some account of his discoveries in histology and pathology, notes the various stages in the evolution of antiseptic surgery and, in something of Lister's own spirit, finds some explanation and even excuse for the extraordinary apathy and antagonism with which the New Learning was received by his own countrymen, "doubtings and discords" which make a sorry contrast to the serene indomitable patience and faith of one who built on the "solid ground of nature".

The author is modest in forecasting the verdict of history on his illustrious relative. "Possibly some captious critic may doubt his originality because he did not invent the germ theory himself, but none can deny that he was the first to grasp its bearing on wound treatment, and the first to proclaim the necessity and the possibility of making surgery aseptic. . . . It will have to be allowed that he showed what the new surgery was to be by performing operations that had previously been considered unjustifiable and that it was only by following his example that the enormous advances of the last half century have been made."

He tells us that "as Lister grew older he looked back with fond affection to his early physiological and pathological work. It troubled him to see how far it had been forgotten and he feared that

Frosst's Blaud Capsules present a known quantity of freshly precipitated Ferrous Carbonate prepared after our own process. Each 10 gr. Capsule contains approximately 1 gr. of Iron in the Ferrous state.

"The result of our examination shows that of three leading Blaud preparations bought by us on the open market, the iron in Frosst's Blaud Capsules showed the highest percentage of Ferrous Carbonate."
Milton Hersey Co., Limited

FROSST'S BLAUD CAPSULES

These Capsules do not oxidize nor harden with age—an ideal form for the administration of iron.

Marketed in ethical packages of 100, they may be prescribed by number to designate formula desired.

Charles E. Frosst & Co.
MONTREAL

E T H E R
FOR
ANESTHESIA
(MALLINCKRODT)

Chemical analyses and exhaustive comparative clinical tests have proven "M. C. W." **Ether for Anesthesia** to be **superior in every respect,** and led to its extensive use in many of the largest and foremost hospitals in this country and United States,

We solicit inquiries from superintendents of hospitals, surgeons, and anesthetists interested in securing an Ether always uniform and of superior purity at moderate cost.

Mallinckrodt Chemical Works
Limited **Montreal**

it would pass still further into oblivion. Perhaps his fears will be justified." We hope not. We cannot imagine any medical man, especially any one who has felt the magic allurement of Physiology and Pathology reading these selections and not wishing to read more. Lister's fame will not rest alone on the application of the Germ Theory to Surgery; genius shines in his work on inflammation and on the nervous system as clearly as in his later work. The author says: "One object of this book will have been attained if its readers are encouraged to search in the collected papers for more of the early work of which it has been only possible to give one example." May his hope be realized! J. S.

A Manual of Venereal Diseases. By L. W. Harrison, D.S.O., M.B., Ch.B., M.R.C.P.E., Brevet Colonel, R.A.M.C. 360 pages, 64 illustrations. Price, $5.00. London, Oxford Medical Publications; Toronto, McAinsh & Co., Limited, 1920.

The author is to be congratulated on the production of a really excellent Manual on this subject. The amount of information which he has been able to include in a small volume is a tribute to the clarity and conciseness of his text. The description of symptoms, the discussion of diagnosis, and the conclusions as to the indicated treatment are all evidently based on the observations of a keen scientific observer, who has had opportunities afforded by a very extensive clinical experience.

The work is eminently practical, thoroughly up to date, and can be highly recommended to every student of this branch of medical science.

A few evident misprints, difficult to avoid in a first edition, are noted, but they are very few and far between. One can perhaps hardly go so far as the author in his opinion that nulliparous women are proportionally much less likely to develop gonococcus infection of the Fallopian tubes than multiparæ. Again his ideas as to the chance of success of the abortive treatment of gonorrhœa are much more optimistic than those of most observers. Referring to the intravenous administration of the various preparations grouped as "914", his statements that either boiled tap water or distilled water may be used, and that the solution may be as concentrated as 0·9 in 2 c.c. would hardly seem to be in accord with the best practice. Indeed the freshness and purity of the distilled water is a most important factor, and one would hesitate to use anything stronger that one tenth of the concentration mentioned.

BENZYLETS

are gelatin globules, each containing five (5) minims of the purest benzyl benzoate.

The clinical tests made by Macht of Johns Hopkins, and his reports in leading medical journals have created much interest in this safe analgesic and antispasmodic—a scientific substitute for opium in many pathologic conditions.

For samples and data please address

Frank W. Horner, Ltd.
38 St. Urbain - Montreal

Product of
Sharp & Dohme, U.S.A.

His dictum that "it is a good general rule not to pass instruments until the urethritis has settled down to the stage where there is only a small morning drop" is excellent teaching.

E. R. S.

THE TREATMENT OF DISEASES OF THE SKIN. By W. KNOWSLEY SIBLEY, M.A., M.D. Third edition. London: Edward Arnold. Price, 12/6.

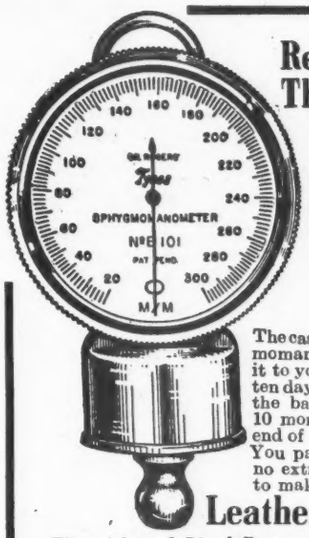
THIS is a very useful work as an aid to treatment; especially in respect to *x*-rays and electricity.

The symptomatology of the various diseases is rather brief and students would be unable in many instances to make a diagnosis.

The illustrations are numerous and of a high standard.

D. K. S.

Trade Mark Registered.
Gluten Flour
40% GLUTEN
Guaranteed to comply in all respects to standard requirements of U. S. Dept. of Agriculture.
Manufactured by
FARWELL & RHINES
Watertown, N. Y.



Rent This TYCOS
Ten Months Then It's Yours
Dr. Rogers' 1921 Model Blood Pressure Inst.
Easy Rental Purchase Plan

The cash price of the Tycos, Dr. Rogers' Sphygmomanometer, is $27.50 in Canada. We will send it to you on receipt of only $2.50 and, if after ten days' trial, you wish to keep it, simply pay the balance—$25.00—the same as rent—in 10 monthly payments of $2.50 each. At the end of that time it is your absolute property. You pay only the cash price (no interest—no extras) and have ten full months in which to make it pay for itself.

Leather Case and Booklet Free

The celebrated Blood Pressure Apparatus, Dr. Rogers' Sphygmomanometer is very accurately made and registers both systolic and diastolic pressures. With every Tycos is included Free a genuine morocco leather case. You can put your Tycos into this case and carry the entire instrument in your pocket. Besides the case we give you Free, a 44-page booklet which explains accurately, thoroughly and plainly just how and why the Sphygmomanometer is essential to the intelligent practice of medicine.

Ten Days' Trial—Money Back

Send today. Just say that you saw our offer in the Canadian Medical Association Journal. Enclose $2.50 for first month's rent and we will immediately send you the instrument, and you will only have to pay $2.50 every succeeding month until the Canadian cash price, $27.50, is paid in full. Send that $2.50 today—first come—first served. The orders are going to come thick and fast, so you will have to hurry. We give ten days' trial and return your money if you are not satisfied. CASH PRICE. The price for all cash with order is just the same, $27.50. We make no distinction.

A. S. ALOE COMPANY
Factory Distributors
584 Olive Street **St. Louis, Mo.**

McGILL UNIVERSITY
MONTREAL
FACULTY OF MEDICINE

The regular course of study leads to the degrees of M.D., C.M. Double courses leading to the degrees of B.A. or B.Sc. and M.D., C.M. may be taken. A course of Dentistry leading to the degree of D.D.S.

In addition there are:

Advanced courses to graduates and others desiring to pursue special or research work in the laboratories of the University or in those of the Royal Victoria and Montreal General Hospital.

A practical course of lectures of from six to twelve months duration to graduates in Medicine and Public Health Officers for the Diploma of Public Health.

A course in Pharmacy for the Diploma in Pharmacy (this course satisfying the requirements of the Pharmaceutical Association of the Province of Quebec).

The Matriculation Examinations for entrance are held in June and September of each year. Full particulars of the examinations, fees, courses, etc., are furnished by the Calendar of the Faculty, which may be obtained from

H. S. BIRKETT, C.B., M.D., Dean **J. W. SCANE, M.D., Assistant Dean**

The Canadian Medical Association Journal

The Official Organ of the Canadian Medical Association and all Provincial Medical Associations of Canada

General Offices, 836 University St. - Montreal.

A. D. Blackader—Chairman, Editorial Board, 836 University St., Montreal.
J. W. Scane—Secretary-Treasurer, 836 University St., Montreal.
T. C. Routley—Associate Secretary, 127 Oakwood Ave., Toronto.

Office of Publication, 192 Spadina Ave. - Toronto.

Subscription price per annum in advance including postage: Canada, Newfoundland and United States, $5.00; Abroad, $6.00.

REMITTANCES should be made by cheque, draft, registered letter, money or express order, and addressed to J. W. Scane, Secretary-Treasurer, 836 University St., Montreal. Make all cheques, etc., payable to the "Canadian Medical Association."

CHANGE OF ADDRESS—Notice should give both old and new address, and state whether change is permanent or temporary.

WHEN COMMUNICATIONS concern more than one subject—manuscript, news items, reprints, change of address, payment of subscription, membership, information wanted, etc. —correspondents will confer a favor and will secure prompt attention if they will write on a separate sheet for each subject.

DATE OF ISSUE—On the 5th day of the month.

ADVERTISEMENTS

First advertising forms go to press thirty days in advance of the date of issue. In sending in copy time must be allowed for setting up advertisements and for sending proofs. Advertising rates on request.

CONTRIBUTIONS

EXCLUSIVE PUBLICATION: Articles are accepted for publication on condition that they are contributed solely to this journal.

COPYRIGHT: Matter appearing in The Canadian Medical Association Journal is covered by copyright, but as a general thing, no objection will be made to the reproduction in reputable medical journals of anything in our columns providing proper credit be given.

MANUSCRIPTS: Manuscripts should be typewritten, double-spaced, and the original, not the carbon copy, submitted to the respective provincial Editorial Boards as listed on page iv. of this issue. Carbon copies of single-spaced manuscripts are not satisfactory. Used manuscript is not returned.

ILLUSTRATIONS: Half the cost of half-tones and zinc etchings will be paid by us when satisfactory photographs or drawings are supplied by the author. Negatives are not acceptable. Each illustration, table, etc., should bear the author's name on the back. Photographs should be clear and distinct; drawings should be made in black ink on white paper. Used photographs and drawings are returned after the article is published. The Association respectfully invites contributors to limit illustrations to such as are absolute necessary.

ANONYMOUS CONTRIBUTIONS, whether for publication, for information, or in the way of criticism, are consigned to the waste-basket.

NEWS: Our readers are requested to send through the Provincial Editorial Boards items of news, also marked copies of newspapers containing matters of interest to physicians. We shall be glad to know the name of the sender in every instance.

BOARD OF ABSTRACTORS
for the
Canadian Medical Association

E. Archibald
Wesley Bourne
A. T. Bazin
A. D. Campbell
D. G. Campbell
A. B. Chandler
G. A. Fleet
F. M. Fry
A. Goldbloom
F. B. Gurd
R. H. P. Hardisty
A. T. Henderson
C. K. P. Henry
W. H. P. Hill
W. B. Howell
A. B. Illievitz
G. Johnson
J. Kaufman
A. S. Kirkland
D. L. Lewis
A. H. McCordick
F. H. MacKay
F. E. McKenty
D. W. MacKenzie
L. C. McKim
R. B. Malcolm
E. H. Mason
J. L. D. Mason
C. F. Moffatt
D. Morgan
J. A. Nutter
Leo. Pariseau
F. S. Patch
W. J. Patterson
A. Pirie
R. E. Powell
A. Ross
F. A. C. Scrimger
M. L. Seng
Miss Madeline Shaw, R.N.
E. C. Smith
A. Stewart
F. J. Tees
W. G. Turner
W. A. Wilkins
H. P. Wright

CLASSIFIED ADVERTISEMENTS

Advertisements under the following headings cost **$2.00 for 40 words or less**, additional words 5c. each. This rate applies for each insertion.

WANTED	FOR SALE
Apparatus	Apparatus
Assistant	Practice
Books	Sanitaria
Intern	Drug Stores
Location	Locations for Sanit.
Locum Tenens	
Partner	FOR RENT
Partnership	EXCHANGE
Situation	MISCELLANEOUS

RESULTS vs. ECONOMY—DO NOT TRY TO economize at the expense of the effectiveness of your advertisement by omitting important and attractive features. In selling a practice, value of which runs into hundreds of dollars, it is surely unwise to run the chance of losing a prospective purchaser by not including every important fact and favorable item pertaining to the location and practice. Extra words over forty cost 5 cents each.

For the following classifications the rate is **$2.00 for 30 words or less**—additional words 10c. each. This rate applies for each insertion. No gratuitous insertions given under these headings.

Abstracting	Tr. Sch. for Nurses
Automobiles	Nurses Wanted
Auto Accessories	Med. Illustrators
Carriages	Vacation Trips
Collections	Typewriters
Medical Brokers	Printers
Educational	Salesmen
Publishers	

Miscellaneous Commercial Advts.

Classified Ads. are Payable in advance. To avoid delay in publishing, remit with order.

N.B.—We exclude from our columns all known questionable ads. and appreciate notification from our readers relative to any misrepresentation.

Fifty-Second Annual Meeting

Canadian Medical Association

Halifax, July 5th, 6th, 7th and 8th, 1921

Dr. Murdoch Chisholm, President

EXCELLENT PROGRAMME ASSURED
MAKE YOUR RESERVATION EARLY